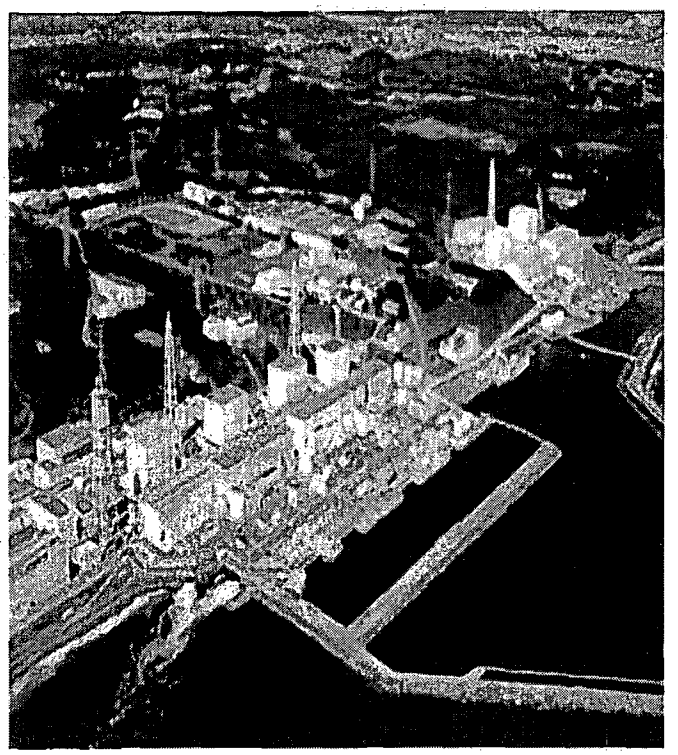
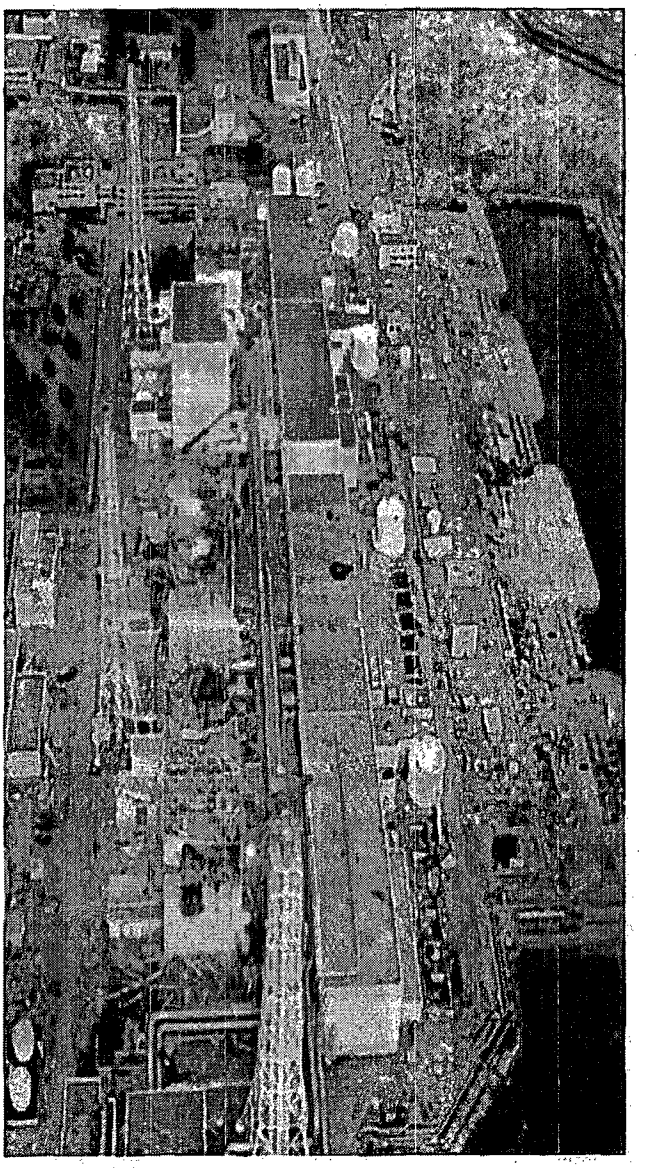
Japan Earthquake Response
April 11, 2011 // 1800 EDT





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This information is for limited distribution to those with a NEED TO KNOW and should not be forwarded outside your agency or organization without prior clearance from U.S. DOE

Contact: DOE/NNSA Nuclear Incident Team: (b)(6)

Current Status

- Magnitude 6.6 (downgraded from 7.1) aftershock along east coast of Japan resulted in initial loss of electricity, brief evacuation of responders, and subsequent temporary use of external backup systems (fire engines, etc.) before electricity was quickly restored.
- GOJ announced expansion of voluntary evacuation area around the Daiichi nuclear reactor complex to 30km (from 20km). Consideration being given to making first 20km mandatory.
- TEPCO has confirmed discharge of low-level radioactive water into Pacific was completed at 1740 JST on 10 April. Total amount discharged was approximately 10,390 tons water with total radioactivity of 150 billion bq.
- TEPCO continues injecting nitrogen gas into Unit 1 reactor containment vessel to prevent possible hydrogen explosion. Containment vessel pressure is rising slightly due to the injection.
- TEPCO installing steel curtain around Unit 2 seawater intake to control contamination, plans similar curtain for Units 1, 3 and 4.
- Radiation levels continue to fall at Fukushima Daiichi complex
- Reactors 1-4 and spent fuel pools generally stable and continue to receive fresh water injections (see text SITREP for detailed info)
- TEPCO reports that the crack in concrete shaft near Reactor 2 was sealed as of Wednesday and water in the shaft has risen 12 cm

DOE/NNSA Emergency Response

- **Command, Control, Coordination:**
  - ***Nuclear Incident Team (NIT):*** Coordinating overall emergency response
  - ***Policy Working Group (PWG):*** Coordinating overall policy
  - ***Senior Energy Official:*** Primary Manager of deployed field teams
  - ***Liaisons:*** DART, USPACOM, USAID, NRC
- **Modeling and Assessment**
  - ***National Atmospheric Release Advisory Center (NARAC):*** Conducting predictive radioactive atmospheric dispersion modeling
  - ***Consequence Management Home Team (CMHT):*** Providing scientific assessment of ground measurements and AMS flights
- **Field Monitoring**
  - ***Consequence Management Response Team (CMRT):*** Conducting ground monitoring, air sampling and initial results analysis
  - ***Aerial Measuring System (AMS):*** Conducting aerial detection for mapping radiological ground material deposits. Currently 2 platforms: 1 Fixed, 1 Rotary
- **Sampling and Lab Analysis**
  - ***Lawrence Livermore and Los Alamos National Labs***: Conducting airborne contamination monitor filter analysis
  - ***Savannah River Site***: Conducting radionuclide analysis of soil samples
- **Medical Consultation**
  - ***Radiation Emergency Assistance Center/Training Site (REAC/TS):*** Providing medical advice about radiological exposure

Deployed* (39)

Yokota AB

(1) SEO
(1) SEO Staff
(26) CMRT
(7) AMS

US Embassy Tokyo

(2) DART LNO

**The number deployed does not currently reflect DOE/NNSA personnel assisting in nuclear energy (NE) aspects of the response.*

~~Official Use Only~~

Significant Events: Past 24 Hrs.

Bilateral Coordination:

- Prepared training and custody transfer of High Purity Geranium (HPGe) to:
  - National Institute of Public Health (NIPH) for drinking water analysis
  - Ministry and Agriculture, Forestry, and Fisheries (MAFF) for soil sample analysis
- Obtained approval for Unattended Early Warning System deployment from Cabinet Office
  - Continued coordination of deployment with USFJ and JSDF
  - Continued work to define notification thresholds and process in the event of a detection

Nuclear Incident Team:

- Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, DIA, NCMI, and WH
- Continued coordination of rotation for deployed personnel

Significant Events: Past 24 Hrs.

- **Modeling and Assessment**
  - Continued to normalize models to field measurements, assess time correlated deposition, and correlate dose rate measurements to actual weather patterns
  - 1st year dose estimate plot based upon AMS measurements & NRC source term
- **Field Monitoring**
  - Aerial Monitoring (coordinated with MEXT)
    - AMS UH-1: Surveyed coastal area 6 mi north of Fukushima Daiichi to 60 km line
    - AMS C-12: Conducted surveys between 30 and 60 km lines northwest of plant
  - Ground Monitoring
    - Continued monitoring activities at US Embassy Japan, Embassy Resident Towers , Yokota AB
- **Sampling and Lab Analysis**
  - Conducting analysis of US soil sample shipped to LANL; results expected 12 Apr
  - Japanese soil samples en route to Savannah River Site: ETA 1200 12 Apr
  - 54 air samples collected from USEMB, Harris Tower, and Yokota AB have arrived at GEL Laboratory. 20 samples have been processed; results under review
- **Medical Consultation**
  - Nothing substantial to report

Data Inputs

- **Monitoring**
  - 290 hours total flying time for Aerial Measuring System (AMS) fixed and rotary-wings
  - Over 139,000 total field measurements taken by DOE, DoD, and GOJ fixed stations and deployed teams
- **Sampling**
  - 386 total air samples taken at US facilities throughout Japan undergoing lab analysis in US
  - 1 US soil sample shipped from LLNL to LANL for further lab analysis
  - 89 Japan soil samples shipped to Savannah River Site

Organizations Providing Data

- **Consequence Management Response Team**
  - CMRT
  - AMS
  - AFRAT
- **External US**
  - Japan Emergency Command Center, US Embassy, Tokyo
  - USAF, BSC Commander
  - USAF, WC-135 Constant Phoenix
  - Futenma Marine Corps Air Station
  - Nuclear Regulatory Commission
  - Naval Reactors
- **Japan**
  - Ministry of Foreign Affairs (MOFA)
  - Nuclear Safety Technology Center (NUSTEC)
  - Tokyo Electric Power Company (TEPCO)
  - Ministry of Agriculture, Forestry and Fisheries (MAFF)
  - Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
  - Ministry of Health, Welfare and Labor
  - Nuclear and Industrial Safety Agency (NISA)
  - Nuclear Safety Commission

Guide to Interpretation

US EPA Derived Response Levels (DRLs) for Evacuation and Relocation

- **Early Phase DRL**

  If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated by red.

- **First Year DRL**

  If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated by orange.

- **Fifty Year DRL**

  If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area falls within the second year DRL.

- **Second Year DRL**

  If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated by yellow.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years).

Guide to Interpretation

Areas at Risk for Agricultural Contamination

Aerial measurements can indicate areas where agricultural monitoring and sampling should occur, although they cannot directly determine the amount of contamination of agricultural products grown in these areas.

AMS monitoring results in areas beyond 25 miles from the Fukushima Daiichi reactors show areas where dose rates are many times higher than historical background.

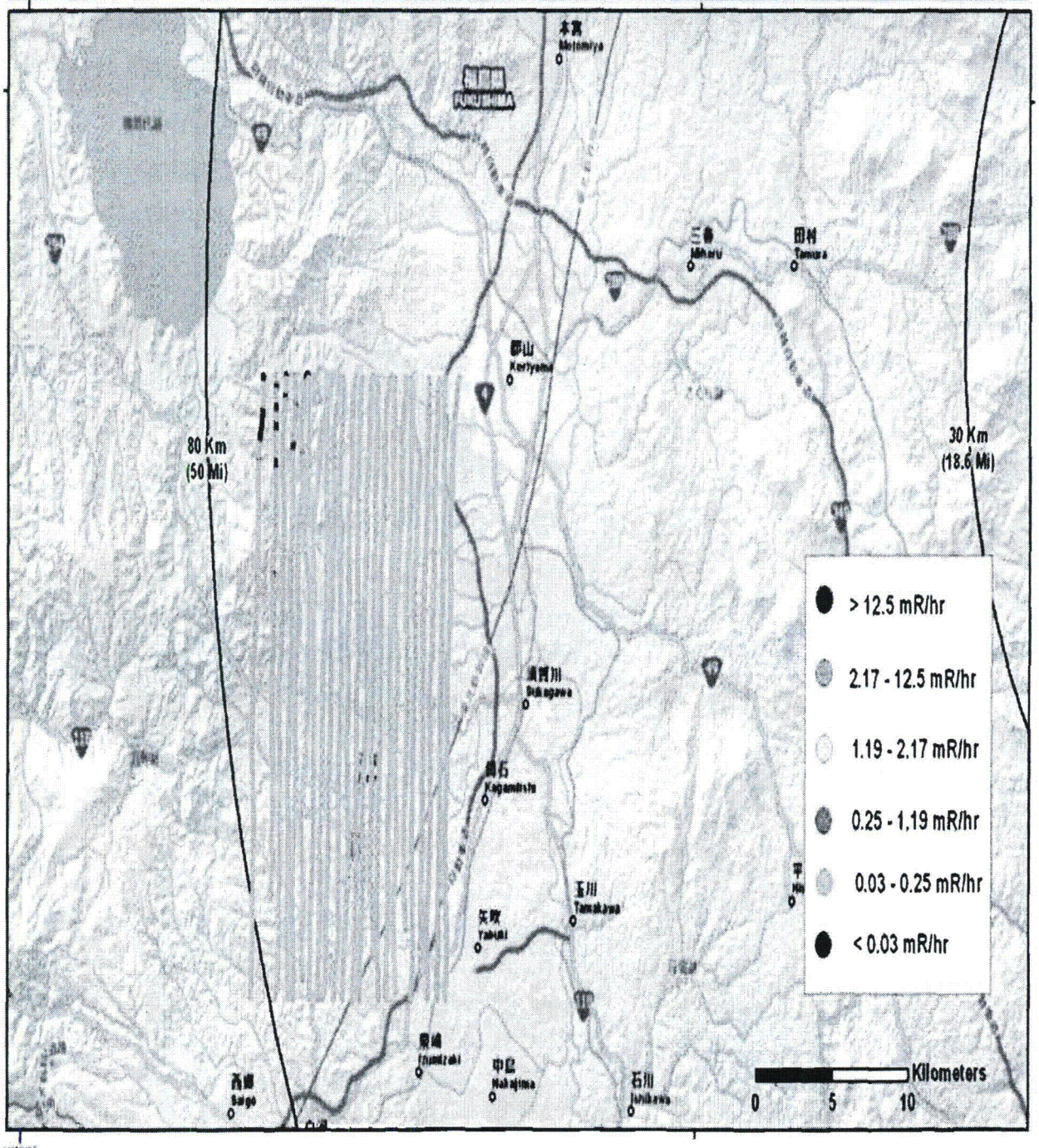
The measured external dose rates in these areas are not high enough to warrant evacuation or relocation of the population, however, lower levels of radioactive contamination in agricultural products provide more of a risk because the radioactive material can be ingested into the body. Agricultural monitoring in these areas may be warranted.

- Areas 10 to 100 times historical background are indicated by green.
- Areas 2 to 10 times historical background are indicated by light blue.
- Areas at or near historical background are indicated by dark blue.

Aerial Monitoring Results
C-12 Flight (April 11, 2011)

FUKUSHIMA DAIICHI
JAPAN

National Nuclear Security Administration



Map created on 04112011 2250 JST

Name: NIT C-12 Results 11Apr2011

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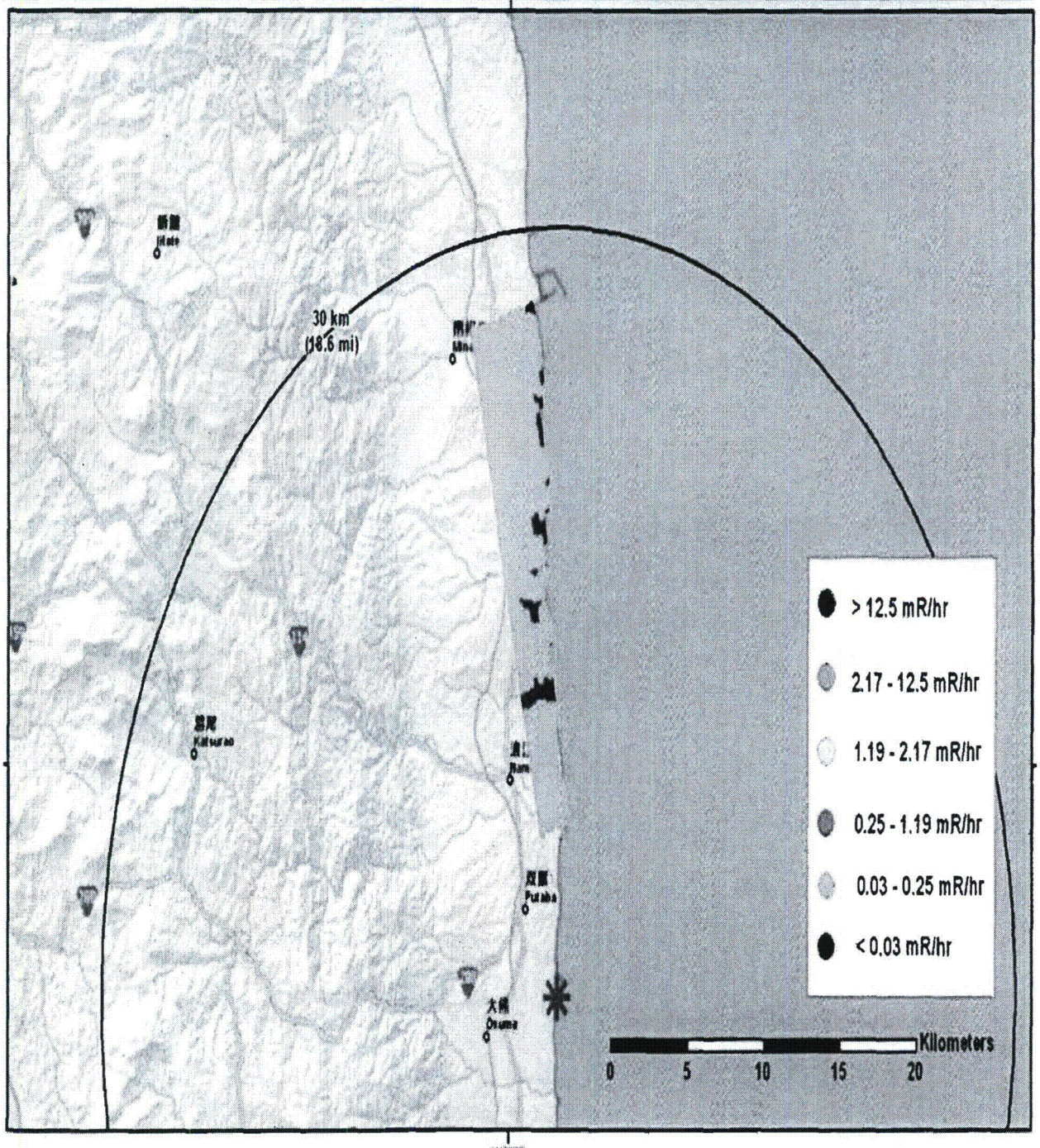
Nuclear Incident Team DOE NIT
Contact (b)(6)

NNSA
National Nuclear Security Administration

Aerial Monitoring Results
UH-1 Flight (April 11, 2011)

FUKUSHIMA DAIICHI
JAPAN



Map created on 04112011 2340 JST

Name: Nuf UH-1 Results 11Apr2011

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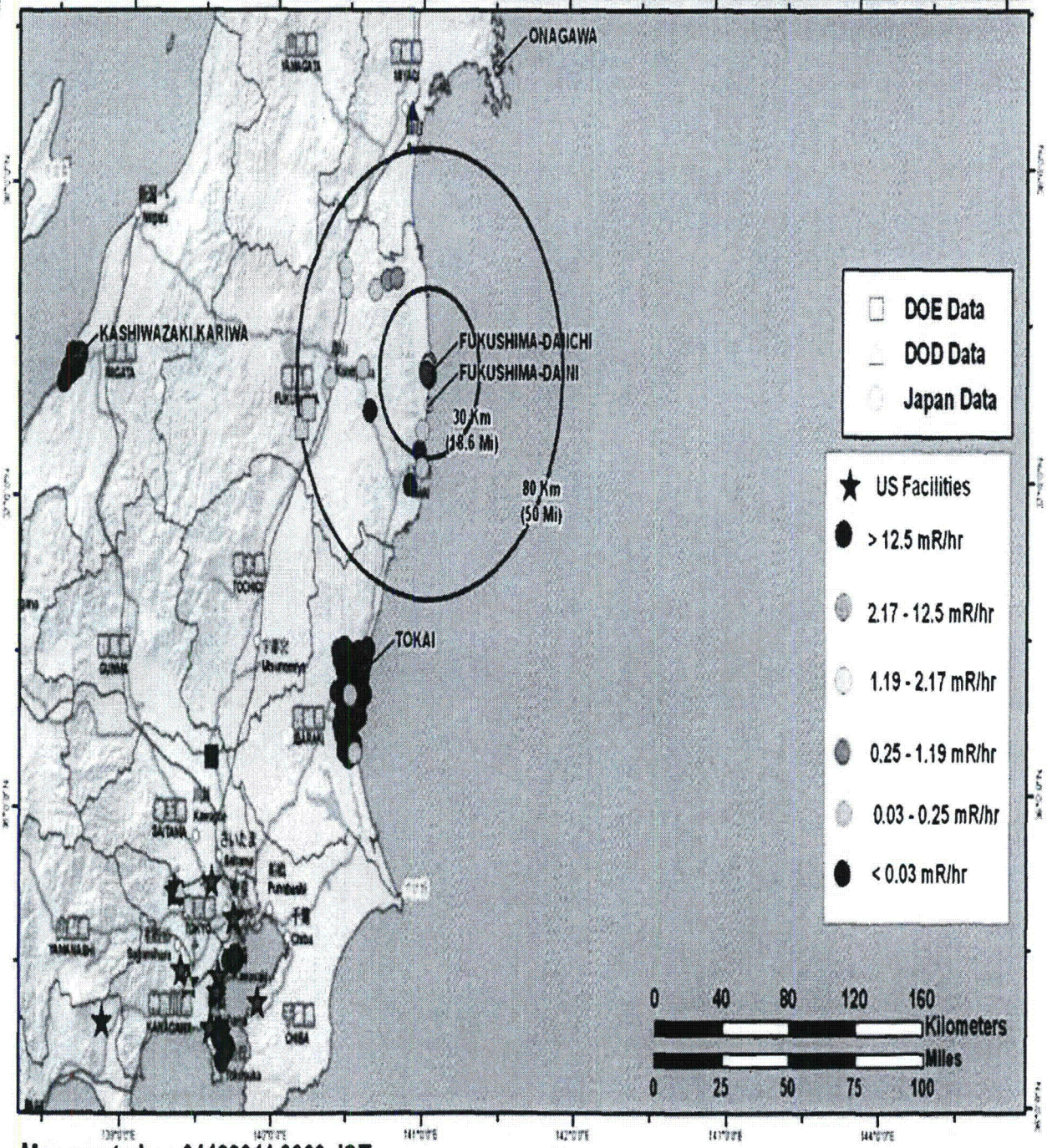
Nuclear Incident Team DOE NIT
Contact (b)(6)

NNSA
National Nuclear Security Administration

Field Monitoring Results
April 11 01:00 to April 12 01:00 JST

FUKUSHIMA DAIICHI
JAPAN



Map created on 04122011 0200 JST

Name: NIT 24hrsMonitoringResults 11Apr2011 0100

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Nuclear Incident Team DOE NIT
Contact (b)(6)

Guide to Interpretation

First-Year Dose Estimate commencing March 16, 2011

This map shows the radiation dose that would be received by people in the first year following the release of radioactive material from the Fukushima Daiichi plant.

- First-Year 2 rem Threshold

  People who did not evacuate this area before the releases occurred would be expected to receive 2 rem or greater dose if they remain in that area for one year following the release. This area is indicated by red. Those that did evacuate the red area prior to plant release (prior to 16 March) would be expected to receive less than a 2 rem dose.

- First-Year 100 millirem Threshold

  People who did not evacuate this area before the releases occurred would be expected to receive 100 millirem or greater dose if they remain in that area for one year following the release. This area is indicated by blue.

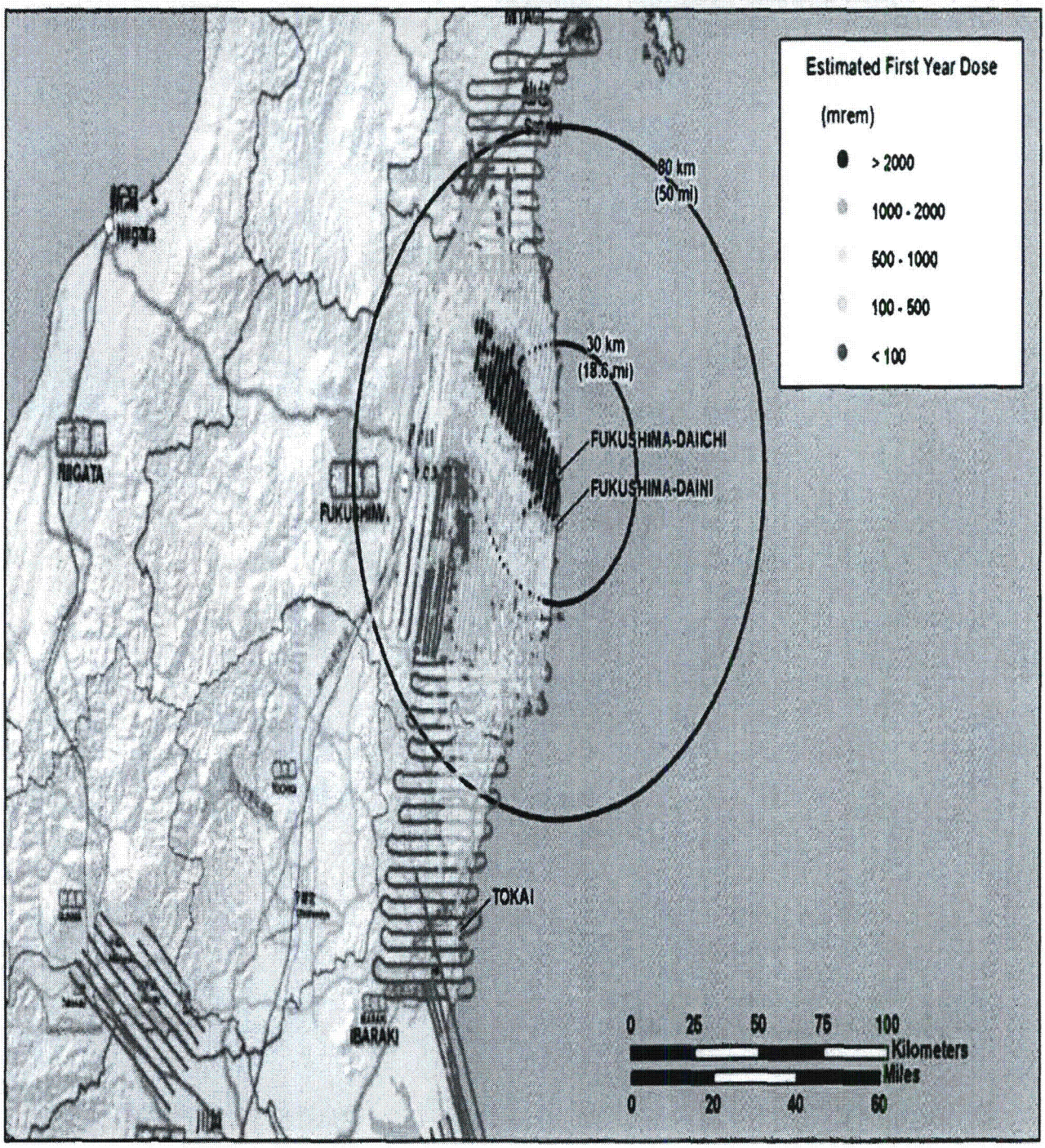
Notes

- **First year dose begins 16 March (explosions 12, 14 & 15 March)**
- **Relocation decisions customarily based on avoidable dose, not previous or total dose**
- **Based on 10 fixed-wing aerial surveys (3/19 to 4/4)**
- **Dose conversion factor computed for each flight to account for decay**
- **Computed dose based on NRC-supplied radionuclide mix, consistent with results to date for nuclides that have been measured**
- **Detailed analysis of samples may permit refinement of radionuclide mix and this map**

First-Year Dose Estimate

Dose Commencing March 16, 2011 for 365 Days

FUKUSHIMA DAIICHI
JAPAN



Map created on 04092011 1300 JST

Name: CMHT A 1stYrDoseEst 08Apr2011

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Nuclear Incident Team DOE NIT

Contact (b)(6)

Guide to Interpretation

Avoidable Dose Estimate commencing April 11, 2011

This map shows the radiation dose that can be avoided by relocating* people for the next year following the release of radioactive material from the Fukushima Daiichi plant.

- First-Year 2 rem Threshold

  People who do not relocate from this area would be expected to receive 2 rem or greater dose if they remain in that area for one year following April 11*. This area is indicated by red. Those that do relocate from the red area would be expected to receive less than a 2 rem dose.

- First-Year 100 millirem Threshold

  People who do not relocate from this area would be expected to receive 100 millirem or greater dose if they remain in that area for one year following the April 11*. This area is indicated by blue.

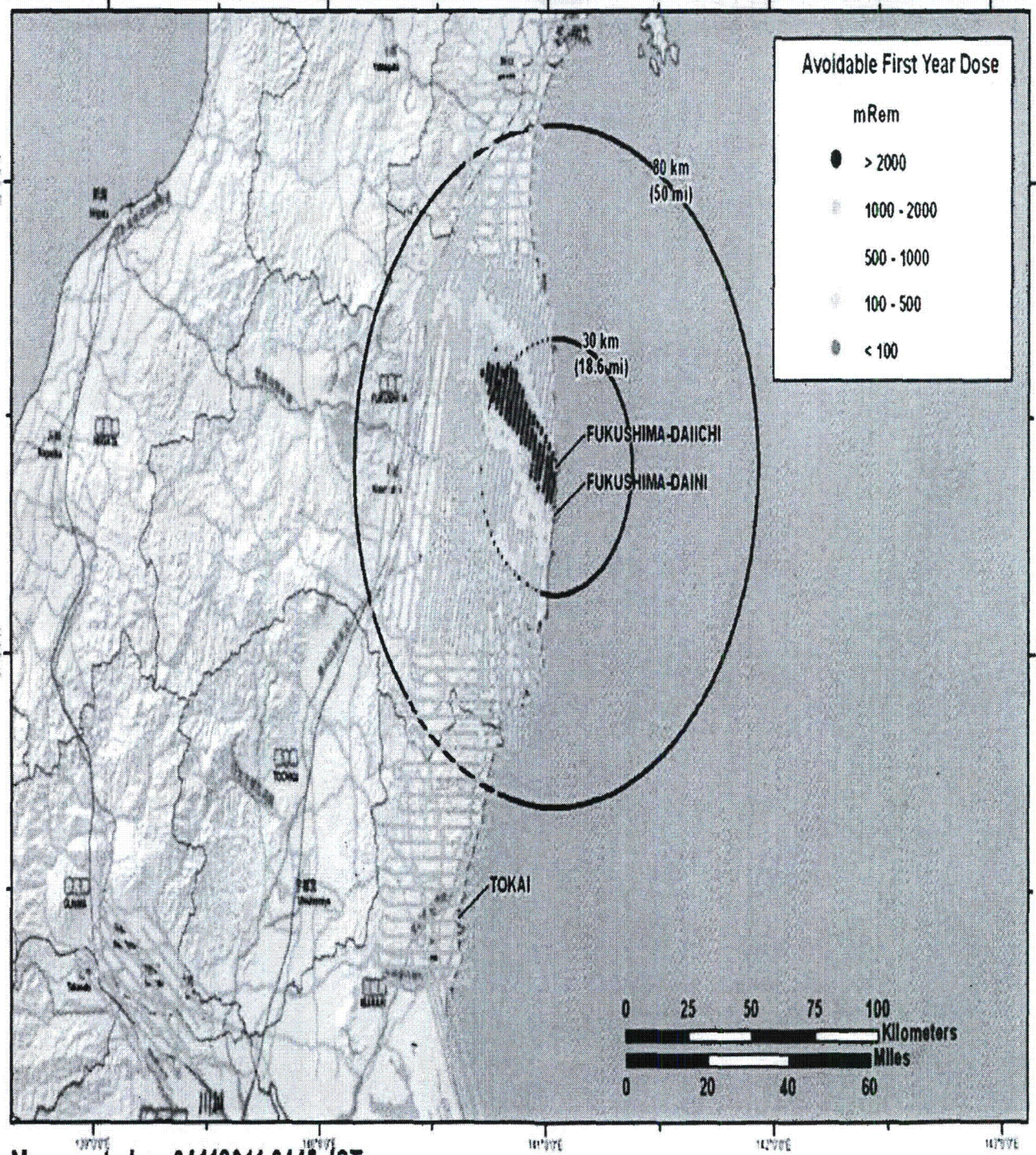
Notes

- *** Actions to reduce environmental contamination can lower the dose received.**
- **The avoidable dose year begins 11 April.**
- **Relocation decisions are customarily based on avoidable dose, not on dose already received.**
- **Based on 10 fixed-wing aerial surveys (3/19 to 4/4).**
- **Dose conversion factor is computed for each flight to account for decay.**
- **Computed dose is based on NRC-supplied radionuclide mix and is consistent with results to date for nuclides that have been measured.**
- **Detailed analysis of samples may permit refinement of radionuclide mix and this map.**

Avoidable Dose Estimate

Dose Commencing April 11, 2011 for 365 Days

FUKUSHIMA DAIICHI
JAPAN



Map created on 04112011 0445 JST

Name: CMHT AverageDoseEst 10Apr2011

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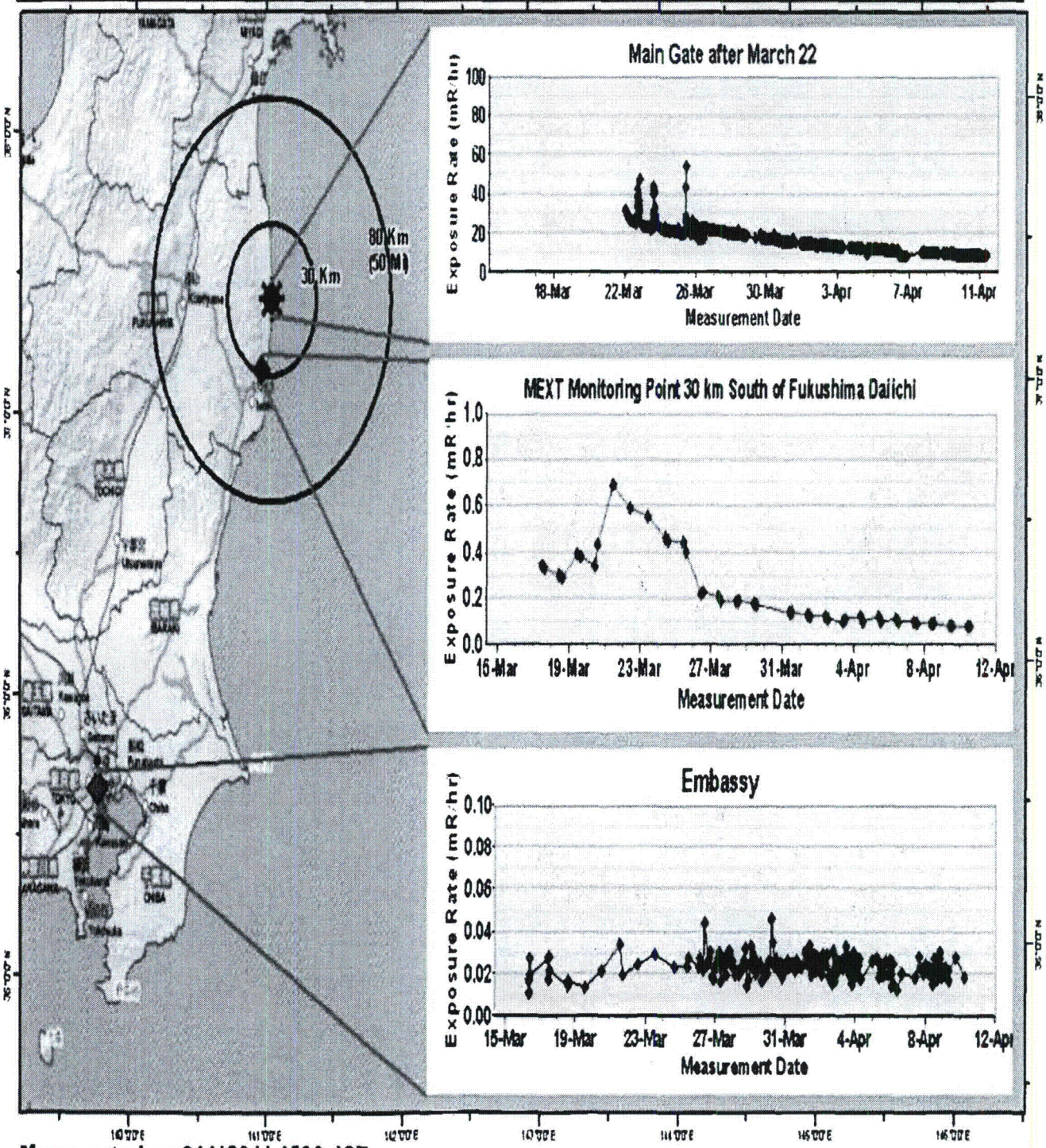
Nuclear Incident Team DOE NIT

Contact (b)(6)

Exposure Rate Trends
From Fukushima South to the U.S. Embassy

FUKUSHIMA DAIICHI
JAPAN

National Nuclear Security Administration



Map created on 04112011 1530 JST

Name: CMHT MonTrend 10Apr2011 Simplified

UNCLASSIFIED

Nuclear Incident Team DOE NIT

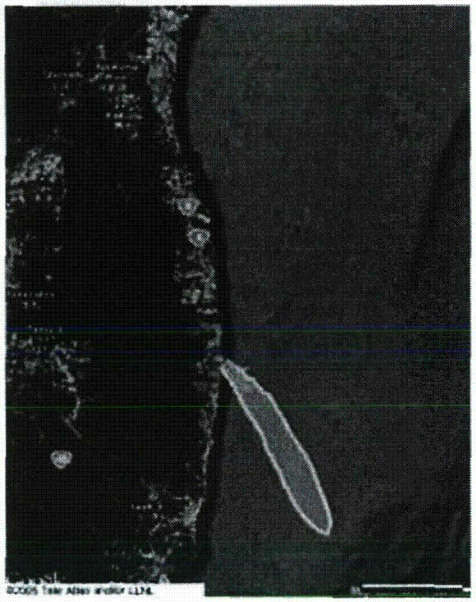
Contact (b)(6)

Aerial and Ground Monitoring Data Assessment

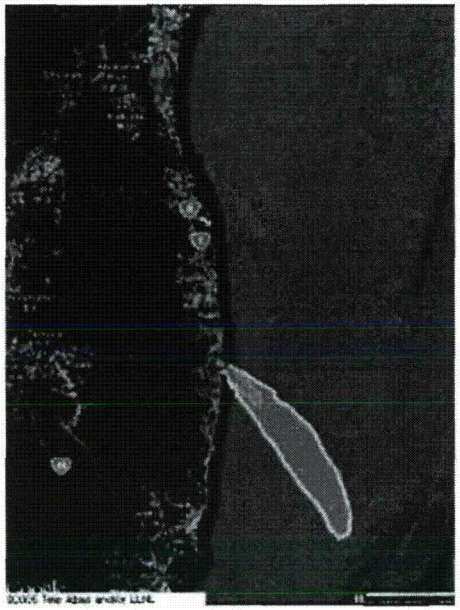
- An assessment of measurements gathered through 10 April continues to show:
  - Radiation levels consistently below actionable levels for evacuation or relocation outside of 25 miles
  - Radiological material has not deposited in significant quantities since 19 March
- An assessment of measurements gathered at US military installations in the Tokyo area through 10 April shows:
  - Radiation levels far below actionable levels for evacuation or relocation
  - All aerial measurements at US facilities were less than 32 μR/hr - a level that poses no known health risk
  - Monitoring of these locations will continue although no increases in deposited radiation are anticipated
- NARAC received local meteorological data from 14 March from GOJ; ECD 14 April to run the NARAC models to provide more accurate deposition

Forecasted Weather
April 12-13, 2011

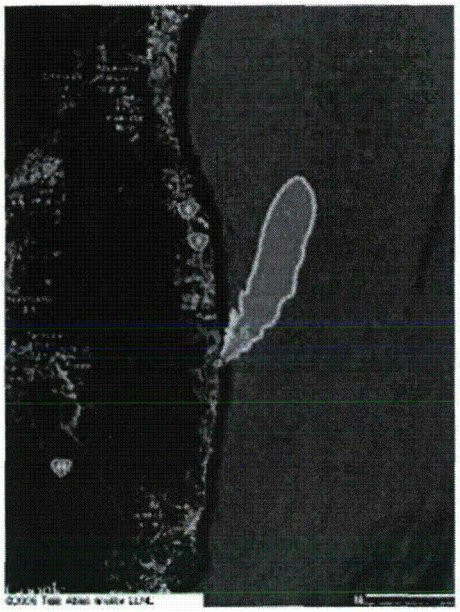
04/12/2011 06:00:00 JST



04/12/2011 18:00:00 JST



04/13/2011 06:00:00 JST

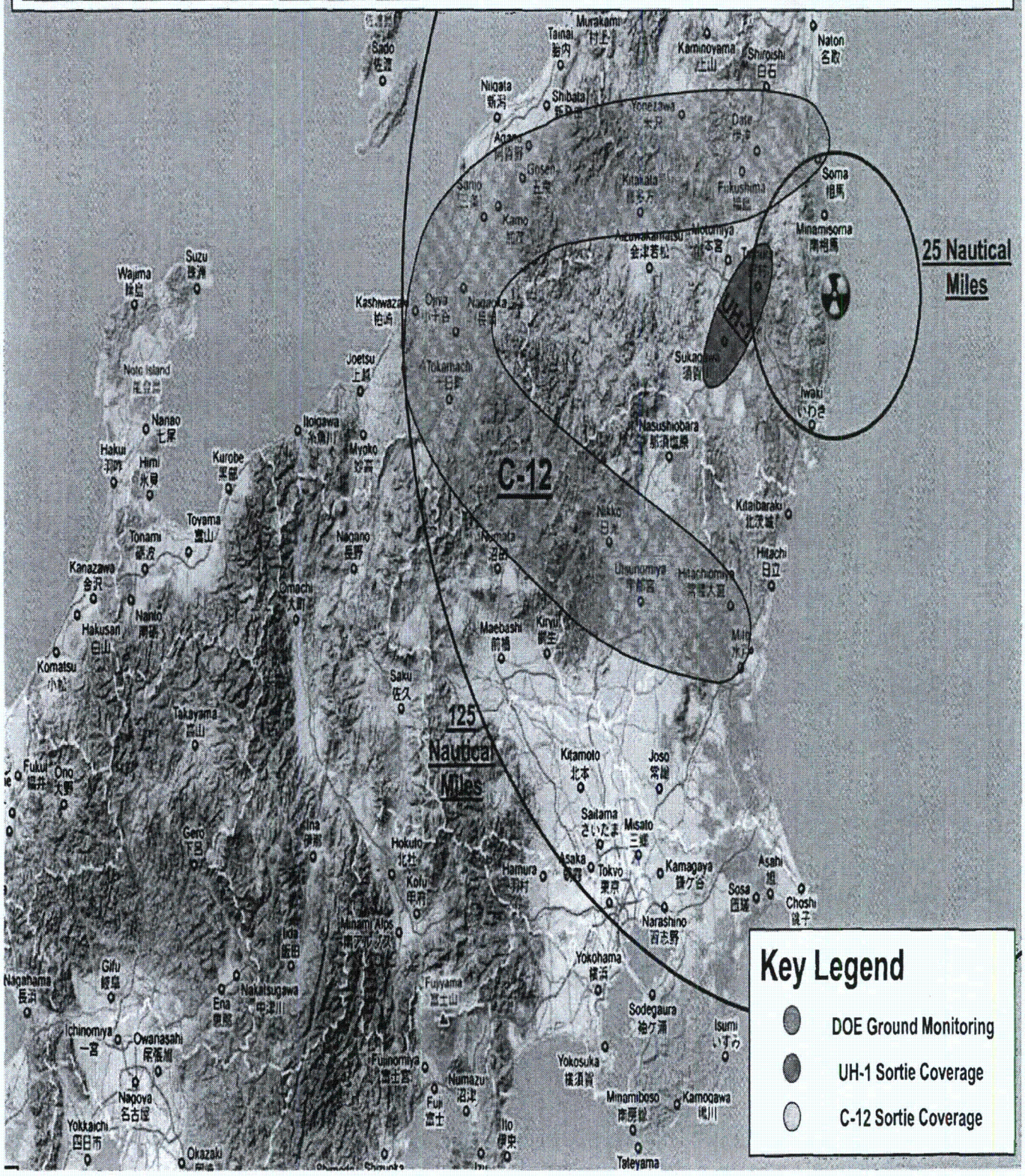


Planned Operations: Next 24 Hrs

- **Field Monitoring**
  - Aerial Monitoring
    - C-12: Survey north, west, and south of warm zone lines. C12 will fly from Mito to west coast, continue north, and fly east to Sendai
    - UH-1: Survey west of Fukushima Daiichi along 60 km line between Koriyama and Fukushima
  - Ground Monitoring
    - Employ high pressure ion chamber to survey UH-1 flight path and test line south of Koriyama
    - Continue monitoring activities at US Embassy Japan, Embassy Resident Towers Tokyo, Yokota AB
    - Begin deployment of Unattended Early Warning System
- **Sampling and Lab Analysis**
  - Expected receipt of 89 Japanese soil samples at SRS

Planned Aerial/Field Monitoring Operations

April 12, 2011 Operational Period



NOTE: From this point forward, DOE will produce only one SITREP per day which will be transmitted at 0600.

DEPARTMENT OF ENERGY SITUATION REPORT
Earthquake & Tsunami in Japan
13 April 2011
0600 (EDT) UPDATE

Yellow highlighted text indicates updates to this version. Older items will be deleted as necessary to minimize the size of this report and facilitate quick reading.

Note: Beginning with the 1800 March 31 SITREP, each entry is labeled with the time and date of the latest SITREP that updated the information. Paragraphs with no indicated time were prepared prior to the 1800 March 31 SITREP and were included as the latest information available. Less frequent information updates are available from Japanese agencies. (0600, 4/2 SITREP)

(NOTE: JST = EDT + 13 hours; EDT = GMT/UTC – 4 hours).

POWER PLANT UPDATE AND OTHER NUCLEAR ISSUES

Per Kyodo news, workers started Tuesday 4/12 1930 JST to begin pumping contaminated water from an underground trench inside the Unit 2 reactor's turbine building. Seven-hundred tons are to be transferred to a "condenser". The operation is expected to take 40 hours. A total of 60,000 tons of contaminated water, found in the basements of the Nos. 1 to 3 reactor turbine buildings as well as the trenches connected to them, need to be removed and stored in nearby tanks. The work began Tuesday evening and an estimated 200 tons of tainted water was moved to a "condenser". The levels of highly radioactive water that had been filling up the trench and the basement of the No. 2 reactor's turbine building were lowered by 4 to 5 centimeters by 7 a.m. Wednesday. (0600 4/13 SITREP)

NISA issued a new provisional rating of level 7 "Major Accident" (an increase from 5) for the accident at the Fukushima Daiichi nuclear power plant on the IAEA International Nuclear and Radiological Event Scale (INES). Level 7 is the most serious level on INES. The new provisional rating considers the accidents that occurred at Units 1, 2 and 3 as a single event on INES. Previously, separate INES Level 5 ratings had been applied for Units 1, 2 and 3. The provisional INES Level 3 rating assigned for Unit 4 still applies. NISA estimates that the amount of radioactive material released to the atmosphere is approximately 10 percent of the 1986 Chernobyl accident, which is the only other nuclear accident to have been rated a Level 7 event. (0600 4/12 SITREP)

Authorities said much of the high-level radiation leaked from Unit 2 on March 15 and 16, early in the accident. Abnormalities in the reactor's suppression pool caused the radiation release, the Japan Nuclear Safety Commission said. Radiation continues to leak from the

AR/36

suppression pool, the commission said, but the volume has dropped considerably. (1800 4/12 SITREP)

Regarding the INES increase from 5 to 7, Denis Flory, the IAEA's deputy director general and head of its department of nuclear safety and security said at a Tuesday news conference, "The Fukushima accident and Chernobyl are very different...Mechanics are totally different." (1800 4/12 SITREP)

Per TEPCO the following is the status of major facilities after the April 11 earthquake centered in Fukushima-Hama-dori:
-No shutdown of the off-site power of the units 1-6
-No abnormalities in water injection to the reactor of the units 1-3, nitrogen gas injection to the reactor containment vessel of unit 1continues.
-No abnormalities were detected in the parameters of each of the units.
-No abnormalities in the data taken from the monitoring before as well as after the earthquake.
(1800 4/12 SITREP)

Other Nuclear Facilities

No information

Update on Reactor Containment Vessels:

Per NHK, nitrogen gas is continuing to be injected into the Number 1 reactor containment vessel without any interruptions since it was temporarily suspended after the April 11 earthquake. However, the pressure level has remained flat over the past few days suggesting that certain gases may be leaking out of the vessel. TEPCO says there has been no significant change in radiation levels around the plant. (1800 4/12 SITREP)

Updates on Cooling Efforts and Cooling Water Management:

No information

Radiation Detection Updates:

Per JAIF 2100 JST Apr 11, radiation level: 0.58 mSv/h at the south side of the office building, 33μSv/h at the West gate, 78μSv/h at the Main gate. (0600 4/12 SITREP)

(Official Use Only) Field Measurements Update (0600 4/13 SITREP):

Recent events of past 24 hours:

- **Modeling and Assessment**
    - Continued to normalize models to field measurements, assess time correlated deposition, and correlate dose rate measurements with actual weather patterns

- **Field Monitoring**
  - **Aerial Monitoring**
    - AMS UH-1:Awaiting confirmation of flight path.
    - AMS C-12: The mission was aborted due to significant turbulence and was unable to survey the high plane of Nagal-Nanyo-Yonezawa or the Navy requested "Warm Zone".
  - **Ground Monitoring**
    - Operations commenced to deploy the Early Warning Array consisting of 8 Infield locations. 7 of the 8 locations were established. A mission to establish the 8th location will be scheduled.
    - Changed air sampler at Yakusuka Naval Base.
    - Continued monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base
- **Sampling and Lab Analysis**
  - Conducting analysis of US soil sample shipped to LANL; initial results undergoing decay correction
  - 54 air samples collected from USEMB, Harris Tower, and Yokota AB have arrived at GEL Laboratory. 20 samples processed; remainder undergoing analysis
- **Medical Consultation**
  - Nothing substantial to report

Planned operations over the next 24 hours:

- **Aerial Monitoring**
  - AMS C-12: Will fly West of Fukushima Daiichi along the 60km in an area not yet surveyed.
  - AMS UH-1: Will survey Military installations.
- **Ground Monitoring**
  - Complete beta/gamma exposure rate surveys. Radio nuclide evaluations are to include in-situ measurement assessment of gamma isotopes.
  - Continue monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base.
- **Sampling and Analysis**
  - Continued analysis of air samples at GEL Laboratory
  - Receive and initiate analysis of soil samples at Savannah River Site

<u>Updates by Reactor Unit (updated each SITREP)</u>

Fukushima Daiichi Unit 1 reactor

- Nitrogen gas injection to the reactor containment vessel of unit1 was suspended and was resumed at 2334 JST. (0600, 4/12 SITREP)

- Per JAIF at 0600 JST 13 April, reactor parameters are: RPV pressure channel (A) 0.423 MPaG increase from April 11, channel (B) 0.928 MPaG; water level (A) -1.65 (B) -1.65 meters below the top of the fuel rods; containment vessel pressure 0.190 MPa absolute, decrease from April 9, SFP temperature is 23 °C. Reactor pressure vessel temperature@ water feed nozzle 216.2 °C. (0600, 4/13 SITREP)
- On March 24, the NRC estimated that Unit 1 had 70% core damage.
- The reactor vessel and primary containment are intact.
- Unit #1 contains 292 elements.

- **Fukushima Daiichi Unit 2 reactor**
  - Per JAIF 0600 JST 13 April, RPV pressure (A) -0.018 MPaG, (B) -0.023MPaG; water level -1.50 meters below the top of the fuel rods; containment vessel pressure 0.095 MPaabs; Reactor pressure vessel temperature @ water feed nozzel 170.1 °C. SFP water temperature is 46.0°C. (0600, 4/13 SITREP)
  - On April 11, the NRC estimated that Unit 2 had 30% core damage.
  - NRC EOC statuys update 1200 EDT 11 April , may begin injecting Nitrogen on 20 April (0600, 4/13 SITREP).
  - Unit#2 SFP contains 587 elements.

- **Fukushima Daiichi Unit 3 reactor**
  - Per JAIF, 2210 JST 12 April RPV pressure (A) -0.018 MPaG, (B) -0.086 MPaG; water level (A) -1.850 (B) -2.25 meters below the top of the fuel rods; containment vessel pressure 0.1055 MPa absolute (abs) an increase from 11 April; reactor pressure vessel temperature @ water feed nozzle 96.0 °C. SFP temperature is 56°C. (0600, 4/13 SITREP)
  - On April 11, the NRC estimated that Unit 3 had 25% core damage.
  - Per JAIF 1200 JST 9 April, Unit #3 SFP contains 514 elements
  - NRC EOC status update 1200 EDT Nitrogen injection delayed due to problems accessing equipment on 11 April

- **Fukushima Daiichi Unit 4 reactor**
  - Unit 4 is shutdown with the core removed to the spent fuel pool in December for maintenance on the reactor.
  - Unit #4 SFP contains 1331 irradiated fuel assemblies, plus 204 fresh fuel assemblies. The fresh ones are stacked close together and represent a risk of a low-power criticality, although we have no evidence of a criticality at this time.

- **Fukushima Daiichi Unit 5 reactor**
  - Unit 5 was in a refueling outage at the time of the earthquake.
  - Per JAIF, as of 0700 JST 13 April, the SFP water temp was 35.6°C (1800, 4/11 SITREP)
  - Unit #5 SFP contains 946 elements.

- **Fukushima Daiichi Unit 6 reactor**
  - Unit 6 was in a refueling outage at the time of the earthquake.

- Per JAIF, as of 0700 JST 13 April, SFP water temp was 23.0°C (1800, 4/11 SITREP)
- Unit #6 SFP contains 876 elements.

- **Fukushima Daiichi Common Spent Fuel Pool**
  - No change in condition/status several days. (0600, 4/13 SITREP)

- **Fukushima Daiichi Dry Cask Storage Building**
  - No change in condition/status several days. (0600, 4/13 SITREP)

Sources include:
Federation of Electric Power Companies of Japan
Nuclear Industrial Safety Agency

Links:
http://www.jaif.or.jp/english/
http://www.tepco.co.jp/en/index-e.html
http://nei.cachefly.net/newsandevents/information-on-the-japanese-earthquake-and-reactors-in-that-region/
http://www.iaea.org/
http://www.mext.go.jp/english/
https://iportalwc.doe.gov/
http://www.nisa.meti.go.jp/english/
http://www.fepc.or.jp/english/
http://english.kyodonews.jp/
http://www3.nhk.or.jp/nhkworld/

Other Information

UPDATE ON USG COORDINATION

- TEPCO owns and has experience already with two Talons, including training by Qinetic. They are primarily interested in training on the GPS, gamma cameras and automatic mapping. (1800 4/12 SITREP)

- Robotics and Rad-hardened Cameras – Equipment is at Narita, being held at customs. Embassy/DOE Cherry and METI to resolve. (0600 4/12 SITREP)

- INL 4 person team authorized to travel to Tokyo 4/12, training overlap with Qinetic Team, then deploy to Tsukuba City/AIST for training with GOJ/TEPCO. (0600 4/12 SITREP)

- **Bilateral Coordination**:

  - Meeting with GOJ representatives regarding product development

        - GOJ organizations represented – NSC, MOFA, NISA, MAFF, MEXT, NUSTEC
        - DOE-GOJ agreed to analyze data provided by other country's collection
        - DOE provided a sample of data in GOJ-compatible format
        - Arranged AMS-coordination meeting for Yokota on 4/14
    - Attended Cabinet Office working meeting to prioritize GOJ requests for assistance including:
        - HPGe's: Received updated requests for additional detectors for MAFF, MHLW, and NISA
        - Unattended Radiation Monitoring System: Confirmed approval to implement the System and worked ongoing deployment issues with MEXT, NSC, MOD
        - AMS: Discussed ongoing joint survey plan with MEXT and MOFA
    - Continued planning and coordination to deliver HPGe detectors:
        - First two detectors will be loaned to:
            - National Institute of Public Health (NIPH) for drinking water analysis
            - Ministry and Agriculture, Forestry, and Fisheries (MAFF) for soil sample analysis
        - Current plan is to deliver HPGe's, conduct training, and assist with setup at the GOJ locations
        - NRL HPGe's arrived 4/11 and will be tested once additional dewers arrive. Testing expected to be completed on/about 15 April

- **Nuclear Incident Team:**
    - Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, DIA, NCMI, and WH
    - Finalized rotation for deployed personnel
    Triage completed spectral analysis of USFJ C-12 aircraft oil coolers

Media Reports

"Workers continue to remove toxic water, cool spent nuke fuel pools" Workers at the crisis-hit Fukushima Daiichi nuclear plant continued Wednesday to remove highly radioactive water in the plant and cool a spent nuclear fuel pool, as part of efforts to put an end to the ongoing emergency, which is now acknowledged as one of the world's worst nuclear disasters. A magnitude 5.8 quake that hit areas near the power station Wednesday morning did not obstruct recovery efforts or cause any abnormalities at the plant, the government's Nuclear and Industrial Safety Agency said. The plant operator Tokyo Electric Power Co. kept pumping out highly polluted water from an underground tunnel-like trench to a nearby storage area inside the No. 2 reactor's building. The work began Tuesday evening and an estimated 200 tons of tainted water was moved to a "condenser," where in normal operations steam from the reactor is converted into water,

by 7:30 a.m. The utility known as TEPCO aims to transfer a total of 700 tons of polluted water by Thursday. Eventually, the operator plans to remove a total of some 60,000 tons of contaminated water, found in the basements of the Nos. 1 to 3 reactor turbine buildings as well as the trenches connected to them, and to store it in nearby tanks and other areas. Hidehiko Nishiyama, a spokesman for the government's nuclear regulatory body, said that as a result of the operation, the levels of highly radioactive water that had been filling up the trench and the basement of the No. 2 reactor's turbine building was lowered by 4 to 5 centimeters by 7 a.m. Wednesday. The toxic water is believed to originate from the No. 2 reactor's core, where fuel rods have partially melted. The water, which has also affected other parts of the plant, is hampering efforts to restore the reactors' key cooling functions, lost in the March 11 earthquake and tsunami. Nishiyama also said TEPCO sprayed some 195 tons of fresh water into a spent nuclear fuel pool at the No. 4 reactor's building through the night, after finding from a sample taken Tuesday from the facility that the temperature of the water was 90 C, much higher than the usual 20-30 C.

TEPCO has been unable to monitor the temperature of the pool water regularly as measuring equipment is not working. The No. 4 reactor, halted for a regular inspection before the quake, had all of its fuel rods stored in the pool for the maintenance work. Nishiyama said TEPCO also found that the radiation level in the air some 6 meters above the pool reached 84 millisieverts per hour before the water-spraying operation. The 400-milliliter water sample will be examined at the adjacent Fukushima Daini plant Wednesday to check to what extent the spent nuclear fuel stored there is damaged. The spokesman also said the utility aims to finish installing seven steel sheets near a seawater intake for the No. 2 reactor later in the day and set up "silt fence" curtain barriers near intakes for the Nos. 3-4 reactors at the six-reactor plant to block the spread of radioactive substances in polluted water. He added that a seawater sample taken Monday 15 kilometers away from the city of Minamisoma, Fukushima Prefecture, near the plant showed a radioactive iodine-131 concentration of about 23 times the maximum level permitted under law, but that it does not pose any health risks. Massive amounts of water have been poured into the reactors and their spent nuclear fuel pools as a stopgap measure to cool them down. But pools of contaminated water have been detected in various parts of the nuclear complex on the Pacific coast, with some water leaking into the sea, as an apparent side effect of the emergency measure

http://english.kyodonews.jp/news/2011/04/85134.html, (0600, 4/13 SITREP)

"Radioactive strontium detected outside 30km zone" Japan's science ministry says small amounts of radioactive strontium have been detected in soil and plants outside the 30-kilometer zone around the Fukushima plant where the government has advised people to stay indoors. Strontium could cause cancer. The ministry has been monitoring the level of radioactive substances in soil and weeds in Fukushima Prefecture. It found 3.3 to 32 becquerels of strontium 90 per kilogram of soil in samples taken from 3 locations in Namie Town and Iitate Village, 30 kilometers from the plant. An extremely small amount of strontium was also found in plants taken from Motomiya City, Ono Town and Otama and Nishigo Villages. The areas are 40 to 80 kilometers from the Fukushima plant

http://www3.nhk.or.jp/daily/english/13_05.html, (0600, 4/13 SITREP)

CONTACT INFORMATION:
Nuclear Incident Team in the Emergency Operations Center

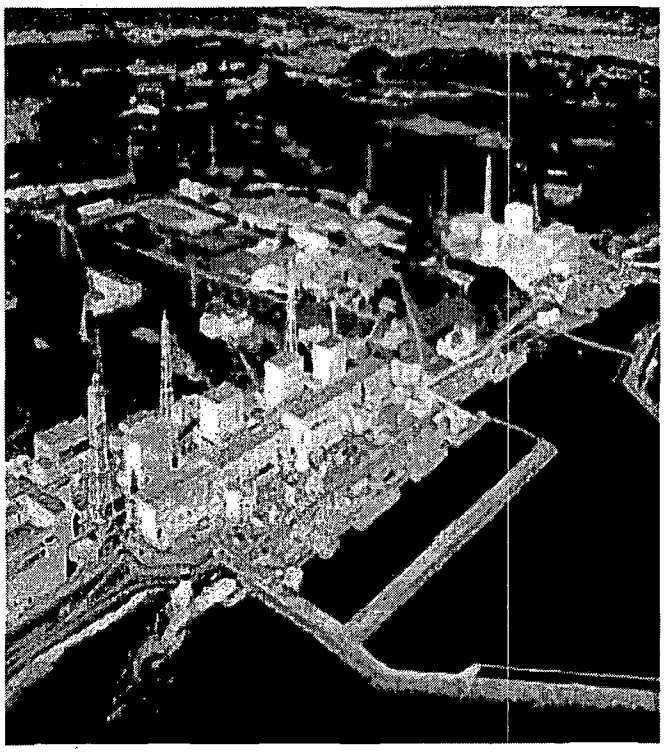
(b)(6)

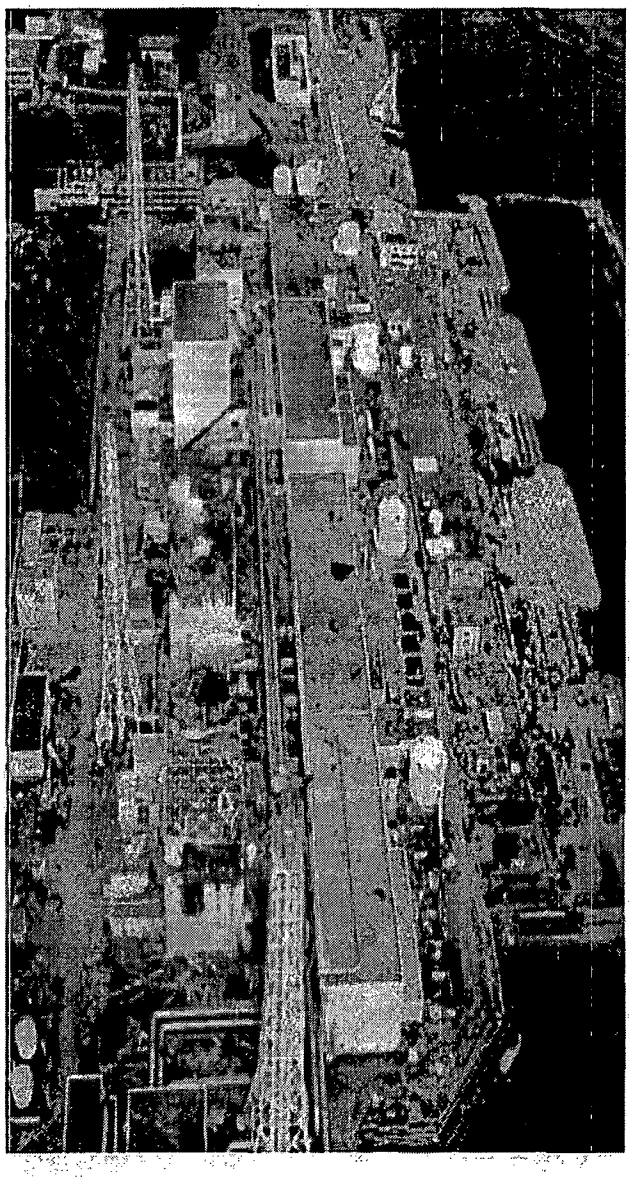
Office of the Deputy Secretary 202-586-5500

Watch Schedule
April 13:
Parrish Staples 0400-0800
Ryan Bechtel

April 14: 0400-0800
Casey Ruberg
Brian Robinson

Japan Earthquake Response
April 13, 2011 // 0600 EDT





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This information is for limited distribution to those with a NEED TO KNOW and should not be forwarded outside your agency or organization without prior clearance from U.S. DOE

Contact: DOE/NNSA Nuclear Incident Team: (b)(6)

Current Status

- Starting 0630 EST, TEPCO began pumping 700 tons low-level contaminated radioactive water from Unit 2 turbine trench to condensers. The levels of highly radioactive water that had been filling up the trench and the basement of the No. 2 reactor's turbine building were lowered by 4 to 5 centimeters by 7 a.m. Wednesday
- NISA issued new provisional rating of level 7 "Major Accident" (an increase from 5) on the IAEA International Nuclear and Radiological Event Scale (INES) for the Fukushima Daiichi nuclear power plant incident
- 11 Apr Magnitude 6.6 (downgraded from 7.1) aftershock along east coast of Japan resulted in initial loss of electricity, brief evacuation of responders, and subsequent temporary use of external backup systems (fire engines, etc.) before electricity was quickly restored
- Small amounts of radioactive strontium have been detected in soil and plants outside the 30-kilometer zone around the Fukushima plant.
- TEPCO continues injecting nitrogen gas into Unit 1 reactor containment vessel to prevent possible hydrogen explosion. TEPCO plans to inject nitrogen into Unit 2 on April 20. nitrogen injection into Unit 3 delayed due to problems accessing equipiment.
- TEPCO installing steel curtain around Unit 2 seawater intake to control contamination, plans similar curtain for Units 1, 3 and 4
- Reactors 1-4 and spent fuel pools generally stable and continue to receive fresh water injections (see text SITREP for detailed info)

DOE/NNSA Emergency Response

- **Command, Control, Coordination:**
  - ***Nuclear Incident Team (NIT):*** Coordinating overall emergency response
  - ***Policy Working Group (PWG):*** Coordinating overall policy
  - ***Senior Energy Official:*** Primary Manager of deployed field teams
  - ***Liaisons:*** DART, USPACOM, USAID, NRC
- **Modeling and Assessment**
  - ***National Atmospheric Release Advisory Center (NARAC):*** Conducting predictive radioactive atmospheric dispersion modeling
  - ***Consequence Management Home Team (CMHT):*** Providing scientific assessment of ground measurements and AMS flights
- **Field Monitoring**
  - ***Consequence Management Response Team (CMRT):*** Conducting ground monitoring, air sampling and initial results analysis
  - ***Aerial Measuring System (AMS):*** Conducting aerial detection for mapping radiological ground material deposits. Currently 2 platforms: 1 Fixed, 1 Rotary
- **Sampling and Lab Analysis**
  - ***Lawrence Livermore and Los Alamos National Labs:*** Conducting airborne contamination monitor filter analysis
  - ***Savannah River Site:*** Conducting radionuclide analysis of soil samples
- **Medical Consultation**
  - ***Radiation Emergency Assistance Center/Training Site (REAC/TS):*** Providing medical advice about radiological exposure

Deployed* (42)

Yokota AB

(1) SEO
(1) SEO Staff
(36) Field Monitoring

US Embassy Tokyo

(4) DART LNO

**The number deployed does not currently reflect DOE/NNSA personnel assisting in nuclear energy (NE) aspects of the response.*

Significant Events: Past 24 Hrs.

Bilateral Coordination:

- Meeting with GOJ representatives regarding product development
  - GOJ organizations represented – NSC, MOFA, NISA, MAFF, MEXT, NUSTEC
  - DOE-GOJ agreed to analyze data provided by other country's collection
  - DOE provided a sample of data in GOJ-compatible format
  - Arranged AMS-coordination meeting for Yokota on 4/14
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  - AMS: Discussed ongoing joint survey plan with MEXT and MOFA
- Continued planning and coordination to deliver HPGe detectors:
  - First two detectors will be loaned to:
    - National Institute of Public Health (NIPH) for drinking water analysis
    - Ministry and Agriculture, Forestry, and Fisheries (MAFF) for soil sample analysis
  - Current plan is to deliver HPGe's, conduct training, and assist with setup at the GOJ locations
  - NRL HPGe's arrived 4/11 and will be tested once additional dewars arrive. Testing expected to be completed on/about 15 April

Nuclear Incident Team:

- Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, DIA, NCMI, and WH
- Finalized rotation for deployed personnel
- Triage completed spectral analysis of USFJ C-12 aircraft oil coolers

Significant Events: Past 24 Hrs.

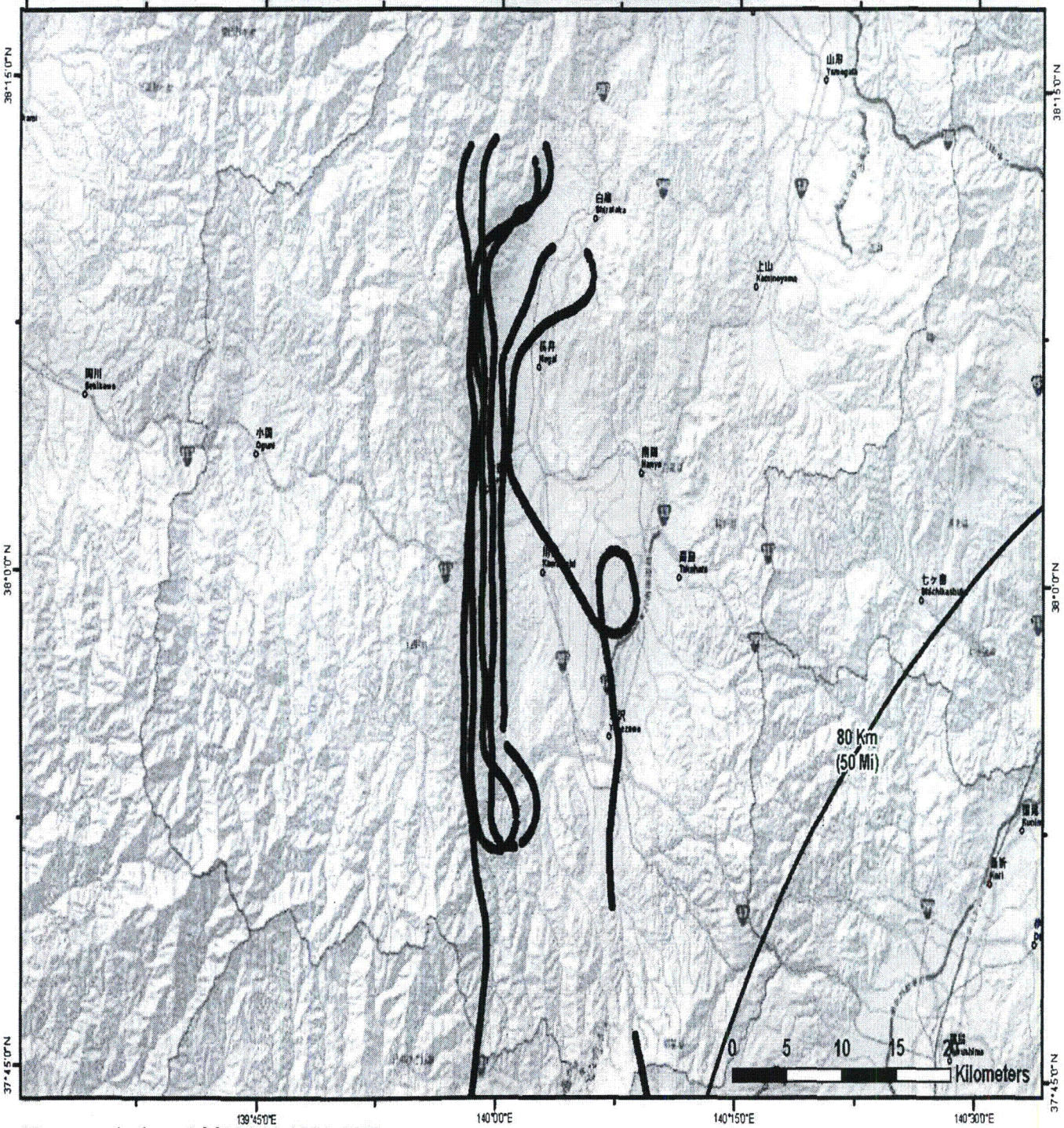
- **Modeling and Assessment**
  - Continued to normalize models to field measurements, assess time correlated deposition, and correlate dose rate measurements with actual weather patterns
- **Field Monitoring**
  - **Aerial Monitoring**
    - AMS UH-1: Awaiting completion of flight
    - AMS C-12: The mission was aborted due to significant turbulence and was unable to survey the high plane of Nagal-Nanyo-Yonezawa or the Navy requested "Warm Zone".
  - **Ground Monitoring**
    - Operations commenced to deploy the Early Warning Array consisting of 8 Infield locations. 7 of the 8 locations were established. A mission to establish the 8th location will be scheduled.
    - Changed air sampler at Yakusuka Naval Base.
    - Continued monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base
- **Sampling and Lab Analysis**
  - Conducting analysis of US soil sample shipped to LANL; initial results undergoing decay correction
  - 54 air samples collected from USEMB, Harris Tower, and Yokota AB have arrived at GEL Laboratory. 20 samples processed; remainder undergoing analysis
- **Medical Consultation**
  - Nothing substantial to report

National Nuclear Security Administration

Aerial Monitoring Path C-12

April 13, 2011

FUKUSHIMA DAIICHI
JAPAN



Map created on 04132011 1300 JST

Name: NIT C-12 Path 04132011

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Nuclear Incident Team DOE NIT
Contact (b)(6)

Data Inputs

- **Monitoring**
  - 323.6 hours total flying time for Aerial Measuring System (AMS) fixed and rotary-wing
  - Over 140,000 total field measurements taken by DOE, DoD, and GOJ fixed stations and deployed teams
- **Sampling**
  - 496 total air samples taken at US facilities throughout Japan for lab analysis in US
  - 52 total ground samples taken throughout Japan for lab analysis in US
  - 89 Japan soil samples shipped to Savannah River Site; Expected arrival 4/13.

Organizations Providing Data

- **Consequence Management Response Team**
  - CMRT
  - AMS
  - AFRAT
- **External US**
  - Japan Emergency Command Center, US Embassy, Tokyo
  - USAF, BSC Commander
  - USAF, WC-135 Constant Phoenix
  - Futenma Marine Corps Air Station
  - Nuclear Regulatory Commission
  - Naval Reactors
- **Japan**
  - Ministry of Foreign Affairs (MOFA)
  - Nuclear Safety Technology Center (NUSTEC)
  - Tokyo Electric Power Company (TEPCO)
  - Ministry of Agriculture, Forestry and Fisheries (MAFF)
  - Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
  - Ministry of Health, Welfare and Labor
  - Nuclear and Industrial Safety Agency (NISA)
  - Nuclear Safety Commission

Guide to Interpretation

US EPA Derived Response Levels (DRLs) for Evacuation and Relocation

- **Early Phase DRL**

  If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated by red.

- **First Year DRL**

  If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated by orange.

- **Fifty Year DRL**

  If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area falls within the second year DRL.

- **Second Year DRL**

  If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated by yellow.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years).

Guide to Interpretation

Areas at Risk for Agricultural Contamination

Aerial measurements can indicate areas where agricultural monitoring and sampling should occur, although they cannot directly determine the amount of contamination of agricultural products grown in these areas.

AMS monitoring results in areas beyond 25 miles from the Fukushima Daiichi reactors show areas where dose rates are many times higher than historical background.

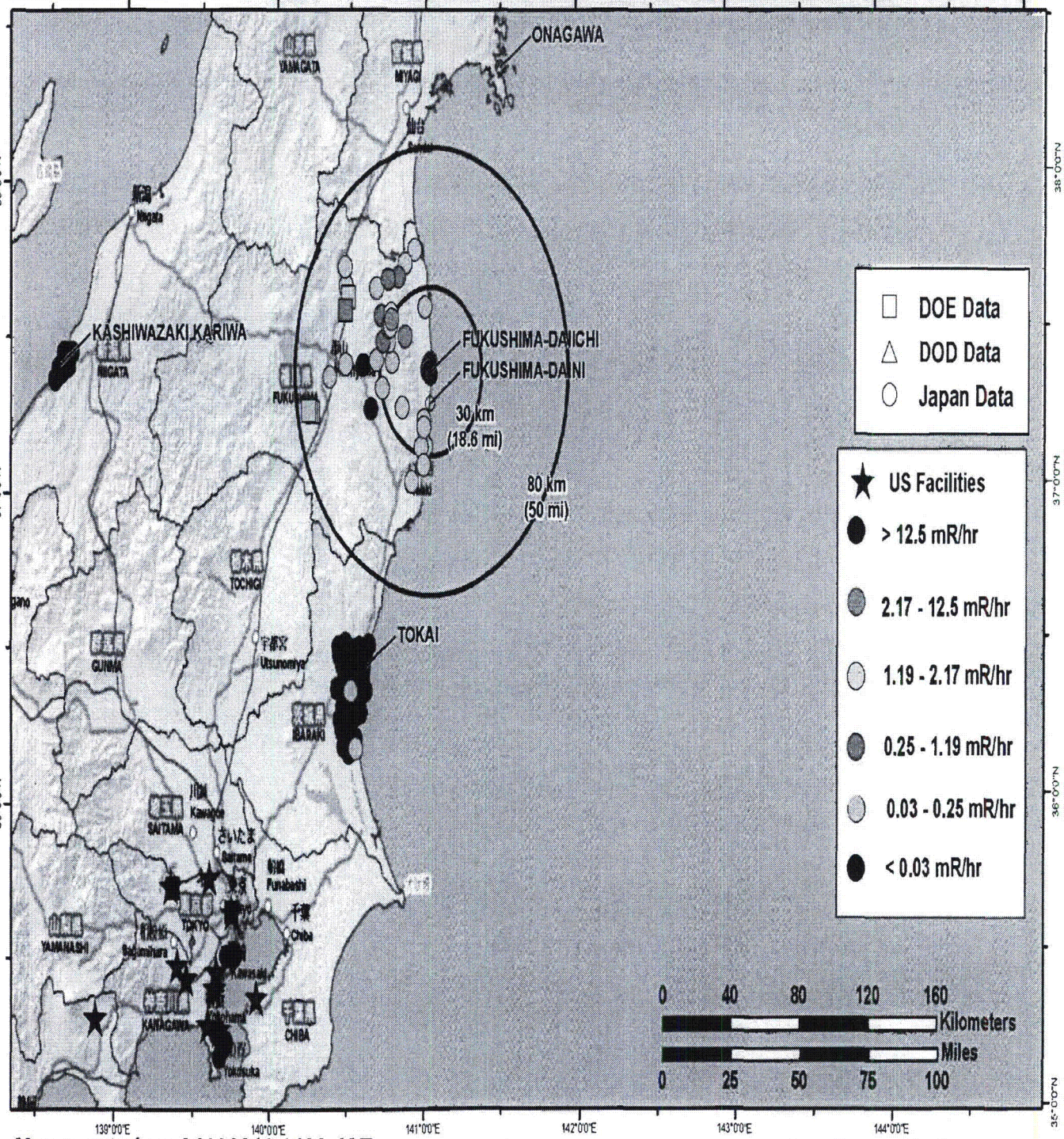
The measured external dose rates in these areas are not high enough to warrant evacuation or relocation of the population, however, lower levels of radioactive contamination in agricultural products provide more of a risk because the radioactive material can be ingested into the body. Agricultural monitoring in these areas may be warranted.

- Areas 10 to 100 times historical background are indicated by green.
- Areas 2 to 10 times historical background are indicated by light blue.
- Areas at or near historical background are indicated by dark blue.

Field Monitoring Results

April 12 13:00 to April 13 13:00 JST

FUKUSHIMA DAIICHI
JAPAN



Map created on 04132011 1400 JST

Name: NIT 24hrsMonitoringResults12Apr2011 1300

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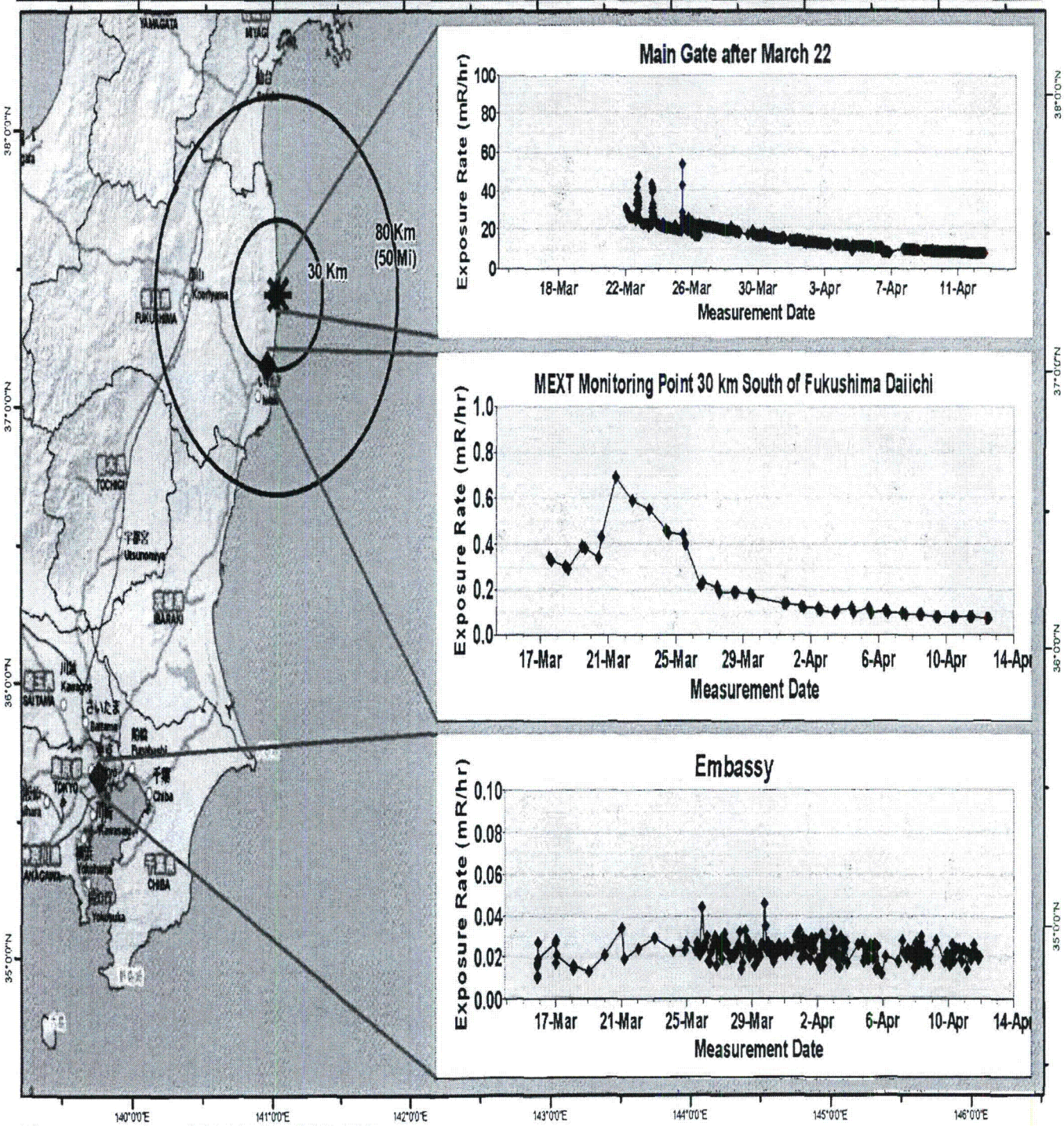
Nuclear Incident Team DOE NIT

Contact (b)(6)

Exposure Rate Trends
From Fukushima South to the U.S. Embassy

FUKUSHIMA DAIICHI
JAPAN

National Nuclear Security Administration



Map created on 04132011 1530 JST

Name: CMHT MonTrend 12Apr2011 Simplified

UNCLASSIFIED

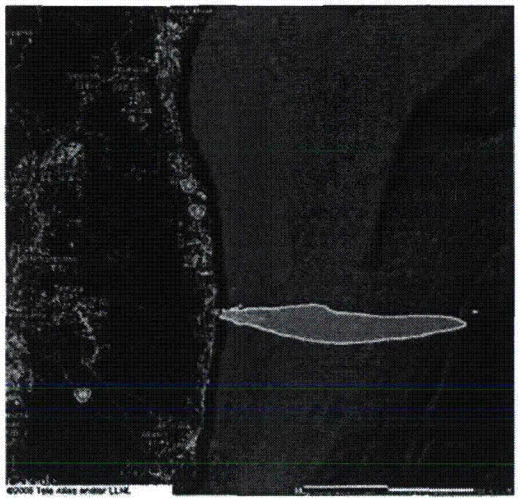
Nuclear Incident Team DOE NIT
Contact (b)(6)

Aerial and Ground Monitoring Data Assessment

- An assessment of measurements gathered through 12 April continues to show:
  - Radiation levels consistently below actionable levels for evacuation or relocation outside of 25 miles
  - Radiological material has not deposited in significant quantities since 19 March
- An assessment of measurements gathered at US military installations in the Tokyo area through 12 April shows:
  - Radiation levels far below actionable levels for evacuation or relocation
  - All aerial measurements at US facilities were less than 32 μR/hr - a level that poses no known health risk
  - Monitoring of these locations will continue although no increases in deposited radiation are anticipated
- NARAC received local meteorological data from 14 March from GOJ; ECD 14 April to run the NARAC models to provide more accurate deposition

Forecasted Weather
April 13-14, 2011

04/13/2011 19:00:00 JST

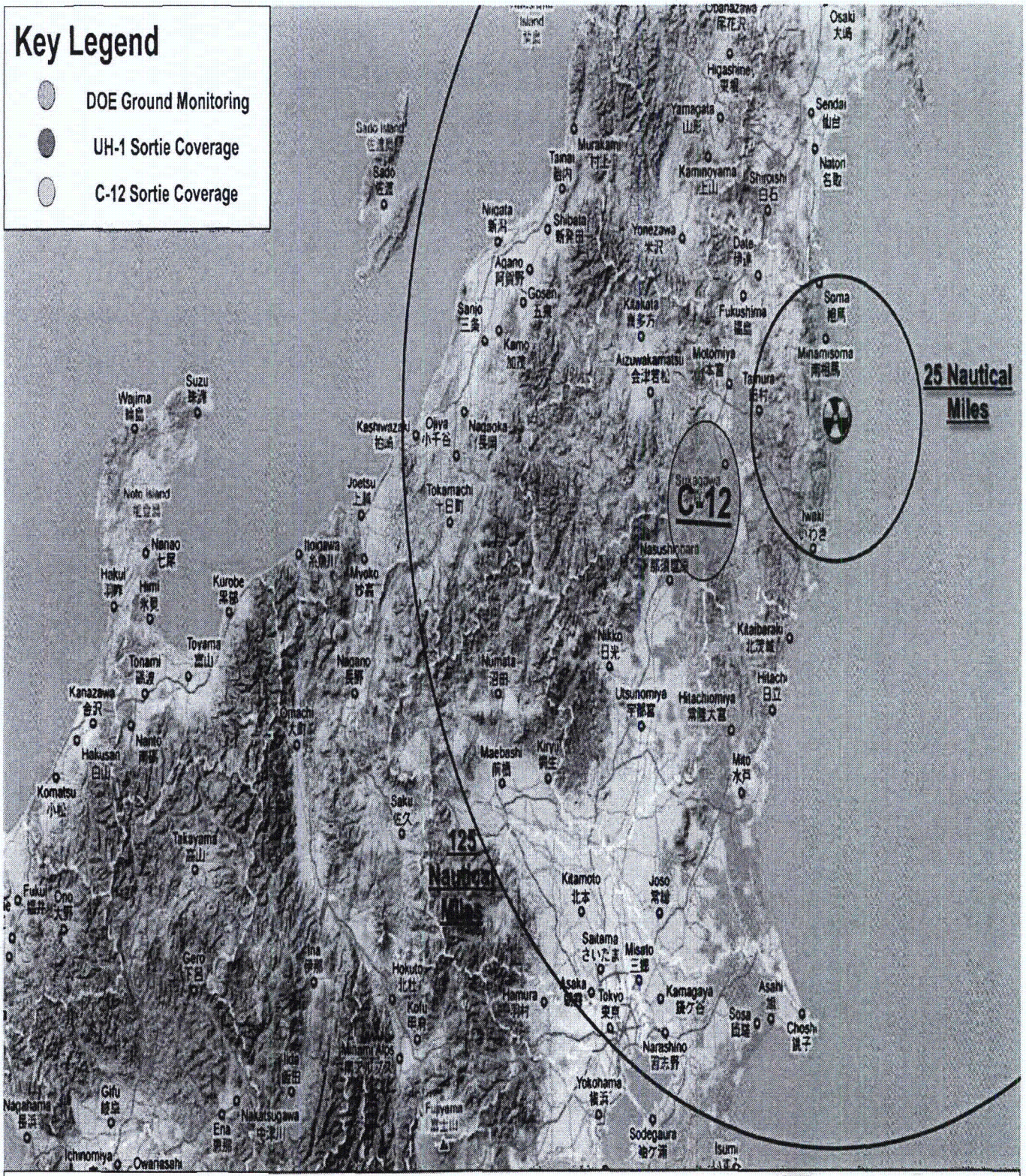


04/13/2011 23:00:00 JST

04/14/2011 03:00:00 JST

Planned Operations: Next 24 Hrs

- Aerial Monitoring
  - AMS C-12: Will fly west of Fukushima Daiichi along the 60km in an area not yet surveyed.
  - AMS UH-1: Will survey US military installations.
- Ground Monitoring
  - Complete beta/gamma exposure rate surveys. Radionuclide evaluations are to include in-situ measurement assessment of gamma isotopes.
  - Continue monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokosuka Naval Base.
- Sampling and Analysis
  - Continued analysis of air samples at GEL Laboratory
  - Receive and initiate analysis of soil samples at Savannah River Site

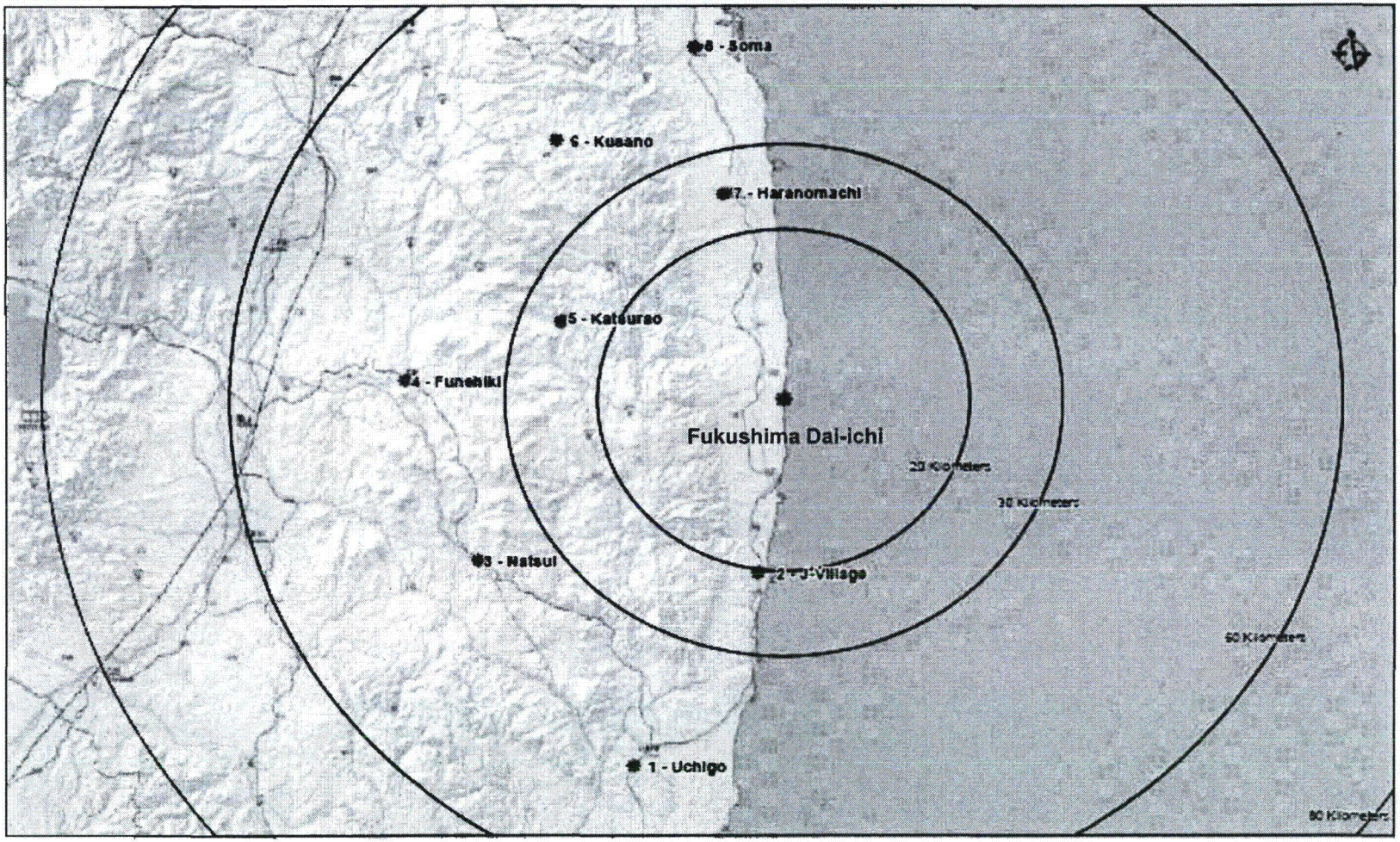


Planned Aerial/Field Monitoring Operations

April 14, 2011 Operational Period

National Nuclear Security Administration

Unattended EWS Placement



* EWS Node 5 – Katsurao was not deployed today, scheduled for later date.

DOE will produce only one SITREP per day which will be transmitted at 0600.

DEPARTMENT OF ENERGY SITUATION REPORT
Earthquake & Tsunami in Japan
14 April 2011
0600 (EDT) UPDATE

Yellow highlighted text indicates updates to this version. Older items will be deleted as necessary to minimize the size of this report and facilitate quick reading.

Note: Beginning with the 1800 March 31 SITREP, each entry is labeled with the time and date of the latest SITREP that updated the information. Paragraphs with no indicated time were prepared prior to the 1800 March 31 SITREP and were included as the latest information available. Less frequent information updates are available from Japanese agencies. (0600, 4/2 SITREP)

(NOTE: JST = EDT + 13 hours; EDT = GMT/UTC – 4 hours).

POWER PLANT UPDATE AND OTHER NUCLEAR ISSUES

Per NHK, at a news conference on Wednesday, TEPCO noted its concern that the spent fuel rods in the storage pool of the No. 4 reactor may be damaged based on interim results of an analysis of samples taken from the pool water on Tuesday. It said levels of radioactive substances including iodine-131 in the samples were higher than those in storage pools under normal circumstances, suggesting that some of the spent fuel may have been damaged. TEPCO says it found 220 becquerels of iodine-131 per cubic centimeter of water, as well as 88 becquerels of cesium-134 and 93 becquerels of cesium-137. The firm says the materials are usually produced by nuclear fission. (0600, 4/14 SITREP)

Per Kyodo News, the vice chairman of the government's Japan Atomic Energy Commission emphasized this week that Japan should thoroughly investigate the nuclear crisis at the Fukushima Daiichi power plant in an internationally verifiable manner, possibly by involving experts from other countries and the IAEA to help guarantee the openness and transparency of the probe. Reports also indicate that the U.S. National Academy of Sciences could also be consulted. (0600, 4/14 SITREP)

Per NHK, Japan's science ministry (MEXT) conducted a computer-simulated prediction of movements of such substances, based on a seawater survey as well as data on currents in nearby waters that indicate that radioactive substances will continue to diffuse to the northeast in the Pacific Ocean for several days after being released from the troubled Fukushima Daiichi nuclear power plant. (0600, 4/14 SITREP)

Per Kyodo news, workers started Tuesday 4/12 1930 JST to begin pumping contaminated water from an underground trench inside the Unit 2 reactor's turbine building. Seven-hundred tons are to be transferred to a "condenser". The operation is expected to take 40

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hours. A total of 60,000 tons of contaminated water, found in the basements of the Nos. 1 to 3 reactor turbine buildings as well as the trenches connected to them, need to be removed and stored in nearby tanks. The work began Tuesday evening and an estimated 200 tons of tainted water was moved to a "condenser". The levels of highly radioactive water that had been filling up the trench and the basement of the No. 2 reactor's turbine building were lowered by 4 to 5 centimeters by 7 a.m. Wednesday. (0600 4/13 SITREP)

Other Nuclear Facilities

No information

Update on Reactor Containment Vessels:

Per NHK, nitrogen gas is continuing to be injected into the Number 1 reactor containment vessel without any interruptions since it was temporarily suspended after the April 11 earthquake. However, the pressure level has remained flat over the past few days suggesting that certain gases may be leaking out of the vessel. TEPCO says there has been no significant change in radiation levels around the plant. (1800 4/12 SITREP)

Updates on Cooling Efforts and Cooling Water Management:

No information

Radiation Detection Updates:

Per JAIF 2100 JST Apr 13, radiation level: 0.55 mSv/h at the south side of the office building, 30μSv/h at the West gate, 73μSv/h at the Main gate. (0600 4/14 SITREP)

(Official Use Only) Field Measurements Update (0600 4/14 SITREP):

Recent events of past 24 hours:

- **Modeling and Assessment**
  - Continued to normalize models to field measurements, assess time correlated deposition, and correlate dose rate measurements with actual weather patterns
- **Field Monitoring**
  - **Aerial Monitoring**
    - AMS UH-1: Surveyed Military installations and the U.S. Embassy. (Campa Asaka, Yokota Air Base,Sagami General Depot, Camp Zama, Atsugi Naval Air Facility, Ikego, Yokosuka Naval Base, Negishi, North Dock, Kisarazu Air Base, and Camp Fuji
    - AMS C-12: Finished the AMS survey area over the cities of Sukagawa and Koriyama at 1000ft AGL 2000 line spacing to further complete the aerial survey.
  - **Ground Monitoring**

- Operations commenced to deploy the Early Warning Array consisting of 8 Infield locations. 7 of the 8 locations were established. A mission to establish the 8th location will be scheduled.
  - One team deployed to Embassy to collect comparative data with USMC and Naval Reactors
- Changed air sampler at Yakusuka Naval Base.
- Continued monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base

- **Sampling and Lab Analysis**
  - 89 samples received by RAP 3 and were transferred to SRNS for laboratory analysis
  - Air samples shipped from LLNL delivered to Radiochemistry lab at LANL
  - Conducting analysis of US soil sample shipped to LANL; initial results undergoing decay correction
  - 54 air samples collected from USEMB, Harris Tower, and Yokota AB have arrived at GEL Laboratory. 20 samples processed; remainder undergoing analysis
- **Medical Consultation**
  - Nothing substantial to report

Planned operations over the next 24 hours:

- **Aerial Monitoring**
  - AMS C-12: Will conduct surveys in the 30 to 60 km circle from approximately 10 to 40 kilometers west of Fukushima- Daiichi between the cities of Koriyama on the south and Watary on the North at 1000ft AGL 2000 line spacing to further complete the aerial survey.
    - Two personnel from MOD Air Defense Command will ride along
  - AMS UH-1: weather and winds permitting, survey the Joint U.S. and Japan Flight Area at 500 ft AGL at 1000 ft line spacing.
    - One personnel from MOD Air Defense Command will ride along
- **Ground Monitoring**
  - A team will establish the final infield unit at Katsurao and will install additional batteries on the J-Village Infield location which should provide power for up to two weeks.
  - Two Field teams will deploy to collect survey data in AMS box west of Koriyama and Sukahama.
  - Complete beta/gamma exposure rate surveys. Radio nuclide evaluations are to include in-situ measurement assessment of gamma isotopes.
  - Continue monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base.
- **Sampling and Analysis**
  - Continued analysis of air samples at GEL Laboratory

- Receive and initiate analysis of soil samples at Savannah River Site

Updates by Reactor Unit (updated each SITREP)

- **Fukushima Daiichi Unit 1 reactor**
  - Per JAIF at 1200 JST 13 April, reactor parameters are: RPV pressure (A) 0.420 MPaG, (B) 0.933 MPaG; water level (A) -1.60 (B) -1.65 meters below the top of the fuel rods; SFP temperature is 26 °C. Reactor pressure vessel temperature@ water feed nozzle 204.5 °C. Containment vessel pressure 0.190 MPa abs (0600 JST 13 Apr), (0600, 4/14 SITREP)
  - Nitrogen gas injection to the reactor containment vessel of unit1 was suspended and was resumed at 2334 JST. (0600, 4/12 SITREP)
  - On March 24, the NRC estimated that Unit 1 had 70% core damage.
  - The reactor vessel and primary containment are intact.
  - Unit #1 contains 292 elements.

- **Fukushima Daiichi Unit 2 reactor**
  - Per JAIF 1200 JST 13 April, RPV pressure (A) -0.016 MPaG, (B) -0.020MPaG; water level -1.50 meters below the top of the fuel rods; containment vessel pressure 0.095 MPa abs; Reactor pressure vessel temperature @ water feed nozzel 166.9 °C. SFP water temperature is 45°C. (0600, 4/14 SITREP)
  - On April 11, the NRC estimated that Unit 2 had 30% core damage.
  - NRC EOC status update 1200 EDT 11 April , may begin injecting Nitrogen on 20 April (0600, 4/13 SITREP).
  - Unit#2 SFP contains 587 elements.

- **Fukushima Daiichi Unit 3 reactor**
  - Per JAIF, 1210 JST 13 April, water level (A) -1.750 (B) -2.20 meters below the top of the fuel rods; containment vessel pressure 0.1063 MPa abs; reactor pressure vessel temperature @ water feed nozzle 92.2 °C. SFP temperature is 59°C (0750 JST 12 April). RPV pressure (A) -0.023 MPaG, (B) -0.083 MPaG (2210 JST 12 April); (0600, 4/14 SITREP)
  - On April 11, the NRC estimated that Unit 3 had 25% core damage.
  - Per JAIF 1200 JST 9 April, Unit #3 SFP contains 514 elements
  - NRC EOC status update 1200 EDT Nitrogen injection delayed due to problems accessing equipment on 11 April

- **Fukushima Daiichi Unit 4 reactor**
  - Per NHK news release, as of 2111 JST 13 April, TEPCO indicated that water temperature in the spent fuel storage pool at the No. 4 reactor in the Fukushima nuclear plant has risen to about 90 degrees Celsius. (0600, 4/14 SITREP)
  - TEPCO took the temperature on Tuesday using an extending arm on a special vehicle. It found the temperature was much higher than the normal level of under 40 degrees. To cool the fuel, TEPCO sprayed 195 tons of water for 6 hours on Wednesday morning. The company thinks the pool's water level was about 5 meters lower than normal, but 2 meters above the fuel rods. TEPCO believes the

water level is likely to rise by about one meter after the water spraying on Wednesday. (0600, 4/14 SITREP)
- TEPCO found 220 becquerels of iodine-131 per cubic centimeter of water, as well as 88 becquerels of cesium-134 and 93 becquerels of cesium-137. Also, levels of radioactive substances including iodine-131 in the samples were higher than those in storage pools under normal circumstances, suggesting that some of the spent fuel may have been damaged. (0600, 4/14 SITREP)
- Per JAIF, as of 1200 JST 13 April, the SFP water temp was 37°C (0600, 4/14 SITREP). This data is in conflict with the news release, see above.
- Unit 4 is shutdown with the core removed to the spent fuel pool in December for maintenance on the reactor.
- Unit #4 SFP contains 1331 irradiated fuel assemblies, plus 204 fresh fuel assemblies.

- **Fukushima Daiichi Unit 5 reactor**
  - Unit 5 was in a refueling outage at the time of the earthquake.
  - Per JAIF, as of 1300 JST 13 April, the SFP water temp was 35.1°C (0600, 4/14 SITREP)
  - Unit #5 SFP contains 946 elements.

- **Fukushima Daiichi Unit 6 reactor**
  - Unit 6 was in a refueling outage at the time of the earthquake.
  - Per JAIF, as of 1300 JST 13 April, SFP water temp was 23.0°C (0600, 4/14 SITREP)
  - Unit #6 SFP contains 876 elements.

- **Fukushima Daiichi Common Spent Fuel Pool**
  - No change in condition/status several days. (0600, 4/14 SITREP)

- **Fukushima Daiichi Dry Cask Storage Building**
  - No change in condition/status several days. (0600, 4/14 SITREP)

Sources include:
Federation of Electric Power Companies of Japan
Nuclear Industrial Safety Agency

Links:
http://www.jaif.or.jp/english/
http://www.tepco.co.jp/en/index-e.html
http://nei.cachefly.net/newsandevents/information-on-the-japanese-earthquake-and-reactors-in-that-region/
http://www.iaea.org/
http://www.mext.go.jp/english/
https://iportalwc.doe.gov/
http://www.nisa.meti.go.jp/english/
http://www.fepc.or.jp/english/
http://english.kyodonews.jp/

http://www3.nhk.or.jp/nhkworld/

Other Information

UPDATE ON USG COORDINATION

- INL 4 person team authorized to travel to Tokyo 4/12, training overlap with Qinetic Team, then deploy to Tsukuba City/AIST for training with GOJ/TEPCO. (0600 4/12 SITREP)

- **Bilateral Coordination**:

  - Japan's Ministry of Economy, Trade and Industry (METI) officials requested additional information regarding proposed application of muon tomography at Fukushima. Tilden to coordinate. (0600, 4/14 SITREP)

  - Conducted an AMS-demonstration and Joint AMS operations discussion Yokota with MEXT and JAEA. (0600, 4/14 SITREP)

  - TEPCO owns and has experience already with two Talons, including training by Qinetic. They are primarily interested in training on the GPS, gamma cameras and automatic mapping. (1800 4/12 SITREP)

  - Robotics and Rad-hardened Cameras – Equipment is at Narita, being held at customs. Embassy/DOE Cherry and METI to resolve. (0600 4/12 SITREP)

    - Meeting with GOJ representatives regarding product development
      - GOJ organizations represented – NSC, MOFA, NISA, MAFF, MEXT, NUSTEC
      - DOE-GOJ agreed to analyze data provided by other country's collection
      - DOE provided a sample of data in GOJ-compatible format
      - Arranged AMS-coordination meeting for Yokota on 4/14
    - Attended Cabinet Office working meeting to prioritize GOJ requests for assistance including:
      - HPGe's: Received updated requests for additional detectors for MAFF, MHLW, and NISA
      - Unattended Radiation Monitoring System: Confirmed approval to implement the System and worked ongoing deployment issues with MEXT, NSC, MOD
      - AMS: Discussed ongoing joint survey plan with MEXT and MOFA
    - Continued planning and coordination to deliver HPGe detectors:
      - First two detectors will be loaned to:

- National Institute of Public Health (NIPH) for drinking water analysis
- Ministry and Agriculture, Forestry, and Fisheries (MAFF) for soil sample analysis

- Current plan is to deliver HPGe's, conduct training, and assist with setup at the GOJ locations
- NRL HPGe's arrived 4/11 and will be tested once additional dewers arrive. Testing expected to be completed on/about 15 April

- **Nuclear Incident Team:**
  - Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, DIA, NCMI, and WH
  - Finalized rotation for deployed personnel
    Triage completed spectral analysis of USFJ C-12 aircraft oil coolers

Media Reports

"Japan continues to struggle to remove highly toxic water at plant" The difficult task of removing highly radioactive water at the crisis-hit Fukushima Daiichi nuclear power plant continued Thursday, with the level of polluted water in the plant's underground trench found to be edging up again that morning after some 660 tons were pumped out. The removal of some 60,000 tons of contaminated water from the basements of the Nos. 1 to 3 reactor turbine buildings as well as trenches connected to them is vital, as the water is hampering work to restore key cooling functions of the reactors lost in the March 11 killer earthquake and ensuing tsunami. Plant operator Tokyo Electric Power Co. pumped out about 660 tons of highly radioactive water Tuesday and Wednesday from one of the trenches to a "condenser" inside the nearby No. 2 reactor turbine building, where in normal operations steam from the reactor is converted into water. But the Nuclear and Industrial Safety Agency said that the water level at the vertical part of the trench as of 7 a.m. Thursday had increased by about 3.5 centimeters from the level observed at 6 p.m. Wednesday. The level of the water is 2.5 centimeters lower than just before the water-transferring mission started. Hidehiko Nishiyama, the agency's spokesman, said that the rise in the water level is likely linked to the continued injection of water injection into the No. 2 reactor core, which is necessary to prevent the nuclear fuel inside from overheating. "As there is believed to be around 20,000 tons of water (in the No. 2 reactor turbine building and the trench connected to it), we feel the difficulty of lowering the level of the water in a stable manner," he said. Tokyo Electric, known as TEPCO, is preparing to transfer more of the highly radioactive water into a facility for nuclear waste disposal in the plant, which can accommodate 30,000 tons of liquid. The water in and around the No. 2 reactor turbine building is believed to contain higher concentrations of radioactive substances than other contaminated water found at the site, and is believed to originate from the No. 2 reactor's core, where fuel rods have partially melted. TEPCO also started looking into how to check the quake resistance of already heavily damaged reactor buildings at the site in line with an order issued Wednesday by the government's nuclear regulatory agency, in light of strong aftershocks from the March 11 quake. The

agency has told the utility to immediately examine the buildings and consider reinforcement work if they are judged as not sufficiently quakeproof. TEPCO, however, has said that it cannot "immediately conduct an investigation" unless it confirms the safety of areas where checkups will be conducted. To enhance preparation for tsunami waves triggered by aftershocks and other emergency situations, emergency diesel power or vehicle-mounted power sources are to be placed at higher ground, while backup units for water injection to the troubled Nos. 1 to 3 reactors are expected to be installed, according to the nuclear agency.

Thursday, April 14, 2011 15:53 +0900 (JST)

http://english.kyodonews.jp/news/2011/04/85401.html (0600, 4/14 SITREP)

"Radiation in seawater drops but remains high" The operator of the disabled Fukushima Daiichi nuclear power station says radiation levels in seawater near the plant are on the decline, but remain high. Tokyo Electric Power Company says it detected 100 becquerels of iodine-131 per cubic centimeter in samples collected near the water intake of the No.2 reactor on Tuesday afternoon. That represents 2,500 times the legal limit. The density was down from 7.5 million times the limit found in the same area on April 2nd. The decline in radioactivity levels comes after the firm stopped highly radioactive water from leaking through a pit outside the reactor on April 6th. The company released 1,320 tons of relatively low radioactive water into the ocean near the outlets of the No.5 and No.6 reactors for the 6 days through April 9th. The company discovered 1.7 becquerels of iodine-131 per cubic centimeter in seawater samples taken from a zone about 30 meters north of the outlets on Tuesday afternoon. That amounts to 43 times the legal limit. The firm also found 1.1 becquerels of the radioactive element in seawater samples collected near a beach 16 kilometers south of the plant on Tuesday morning. That represents 28 times the legal limit. Radiation levels at the same spot have remained almost the same since April 5th.

Thursday, April 14, 2011 07:28 +0900 (JST)

http://www3.nhk.or.jp/daily/english/14_01.html (0600, 4/14 SITREP)

"Most spent fuel not damaged at No. 4 reactor" TEPCO says most of the spent fuel in the storage pool of the No. 4 reactor is apparently undamaged. At a news conference on Wednesday, the firm said the finding is based on interim results of an analysis of samples taken from the pool water on Tuesday. But it said levels of radioactive substances including iodine-131 in the samples were higher than those in storage pools under normal circumstances, suggesting that some of the spent fuel may have been damaged. TEPCO says it found 220 becquerels of iodine-131 per cubic centimeter of water, as well as 88 becquerels of cesium-134 and 93 becquerels of cesium-137. The firm says the materials are usually produced by nuclear fission.

Wednesday, April 13, 2011 21:08 +0900 (JST)

http://www3.nhk.or.jp/daily/english/13_37.html (0600, 4/14 SITREP)

"Temperatures rise at No.4 spent fuel storage pool" The Tokyo Electric Power Company, or TEPCO, says the water temperature in the spent fuel storage pool at the No. 4 reactor in the crippled Fukushima nuclear plant has risen to about 90 degrees Celsius. It fears the spent fuel rods may be damaged. TEPCO took the temperature on Tuesday using an extending arm on a special vehicle. It found the temperature was much higher than the normal level of under 40 degrees. To cool the fuel, TEPCO sprayed 195 tons of water for 6 hours on Wednesday morning. The company thinks the pool's water level was about 5 meters lower than normal, but 2 meters above the fuel rods. TEPCO believes the water level is likely to rise by about one meter after the water spraying on Wednesday. The company also believes temperatures rose after the loss of the reactor's cooling system. TEPCO says high levels of radiation at 84 millisieverts per hour were detected above the water surface, where radiation is rarely detected. The company plans to continue spraying and to analyze radioactive particles in the pool to determine whether the fuel has been damaged. The storage pool at the No. 4 reactor has housed all the fuel rods that were in operation at the reactor due to massive engineering work there. TEPCO has sprayed more than 1,800 tons of water on the No. 4 reactor using fire engines and special vehicles since the March 11th crisis. The company feared that fuel rods could cause evaporation of water and put workers at risk of exposure. University of Tokyo Professor Koji Okamoto says the temperature of 90 degrees indicates that cooling is continuing, although some of the water in the pool may be boiling. Okamoto says high radiation indicates the possibility of radiation leaks from damaged fuel, and called for the evaluation of water sampling to determine how the situation should be tackled. The professor says that to prevent further damage to the fuel, it's important to continue cooling the pool while minimizing water leakage from it.

Wednesday, April 13, 2011 21:08 +0900 (JST)

http://www3.nhk.or.jp/daily/english/13_35.html (0600, 4/14 SITREP)

"Diffusion of radioactive substances predicted" Japan's science ministry says radioactive substances will continue to diffuse to the northeast in the Pacific Ocean for several days after being released from the troubled Fukushima Daiichi nuclear power plant. The ministry conducted a computer-simulated prediction of movements of such substances, based on a seawater survey as well as data on currents in nearby waters. On April 2nd, levels of radioactive iodine-131 near the water intake of the plant's No. 2 reactor were found to be 7.5 million times higher than the legal limit. The ministry says the radiation levels are on the decline, but remain high. The ministry's short-term prediction says the substances will spread from the coast to the northeast, maintaining their levels for several days. The ministry's long-term prediction says the substances will be carried south by a current 100 kilometers offshore in lowered concentrations, then move east with a rapidly-moving current off Ibaraki Prefecture in about a month. The ministry said the concentration of radioactive substances in the sea is likely to decrease gradually. The ministry plans to step up monitoring of the movement of radioactive substances in waters around the plant and release another prediction.

Wednesday, April 13, 2011 19:44 +0900 (JST)

http://www3.nhk.or.jp/daily/english/13_28.html (0600, 4/14 SITREP)

"Commissioner calls for verifiable probe of Fukushima nuke crisis" The vice chairman of the government's Japan Atomic Energy Commission emphasized this week that Japan should thoroughly investigate the nuclear crisis at the Fukushima Daiichi power plant in an internationally verifiable manner, possibly by involving experts from other countries to help guarantee the openness and transparency of the probe. An independent third-party panel, rather than the government's Nuclear Safety Commission, should study the accident's causes and the series of crisis management steps taken in order for Japan to regain the trust of the international community, Tatsujiro Suzuki said in an interview Wednesday with Kyodo News... As options for how to involve foreign experts, he pointed out that the government may either engage the International Atomic Energy Agency in the probe by the envisaged panel, set up a "wise-person committee" of foreign experts to give advice to the panel or ask an internationally renowned academic institution such as the U.S. National Academy of Sciences to verify the results of the probe. Thursday, April 14, 2011 10:38 +0900 (JST)

http://english.kyodonews.jp/news/2011/04/85324.html (0600, 4/14 SITREP)

"High radioactivity detected in fish, vegetables" The health ministry has detected radioactivity above the legal limit in fish caught off Fukushima Prefecture and 11 kinds of vegetables grown in the prefecture. The ministry says it found 12,500 becquerels per kilogram, or 25 times the limit, of radioactive cesium in small fish called sand lances caught off Iwaki City, south of the Fukushima Daiichi nuclear plant on Wednesday. It also discovered 12,000 becquerels, or 6 times the limit, of radioactive iodine in the fish. On April 7th, sand lances caught off the city were already found to be contaminated with radioactive cesium in excess of the limit. Sand lances caught off Ibaraki Prefecture, south of Fukushima, were also found to be polluted with the radioactive substance. The central government says sand lances are currently not being sold as fishing cooperatives in the 2 prefectures are not in operation. Radioactivity was also detected on 11 kinds of vegetables sampled in Fukushima on Monday. Authorities detected 1,960 becquerels per kilogram, or 4 times the legal limit, of cesium on Japanese parsley, known as Seri, grown in Soma City. On Wednesday, the government banned the shipment of some shiitake mushrooms grown outdoors in eastern Fukushima after detecting radioactivity above the legal limit.

Thursday, April 14, 2011 07:28 +0900 (JST)

http://www3.nhk.or.jp/daily/english/14_03.html (0600, 4/14 SITREP)

"Radioactive strontium detected outside 30km zone" Japan's science ministry says small amounts of radioactive strontium have been detected in soil and plants outside the 30-kilometer zone around the Fukushima plant where the government has advised people to stay indoors. Strontium could cause cancer. The ministry has been monitoring the level of radioactive substances in soil and weeds in Fukushima Prefecture. It found 3.3 to 32 becquerels of strontium 90 per kilogram of soil in samples taken from 3 locations in Namie Town and Iitate Village, 30 kilometers from the plant. An extremely small

amount of strontium was also found in plants taken from Motomiya City, Ono Town and Otama and Nishigo Villages. The areas are 40 to 80 kilometers from the Fukushima plant

http://www3.nhk.or.jp/daily/english/13_05.html, (0600, 4/13 SITREP)

CONTACT INFORMATION:
Nuclear Incident Team in the Emergency Operations Center

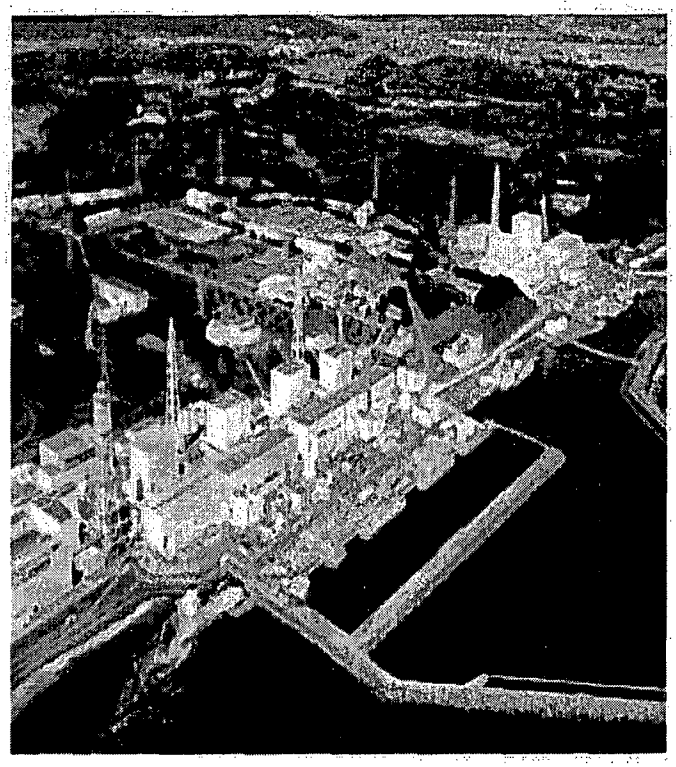
(b)(6)

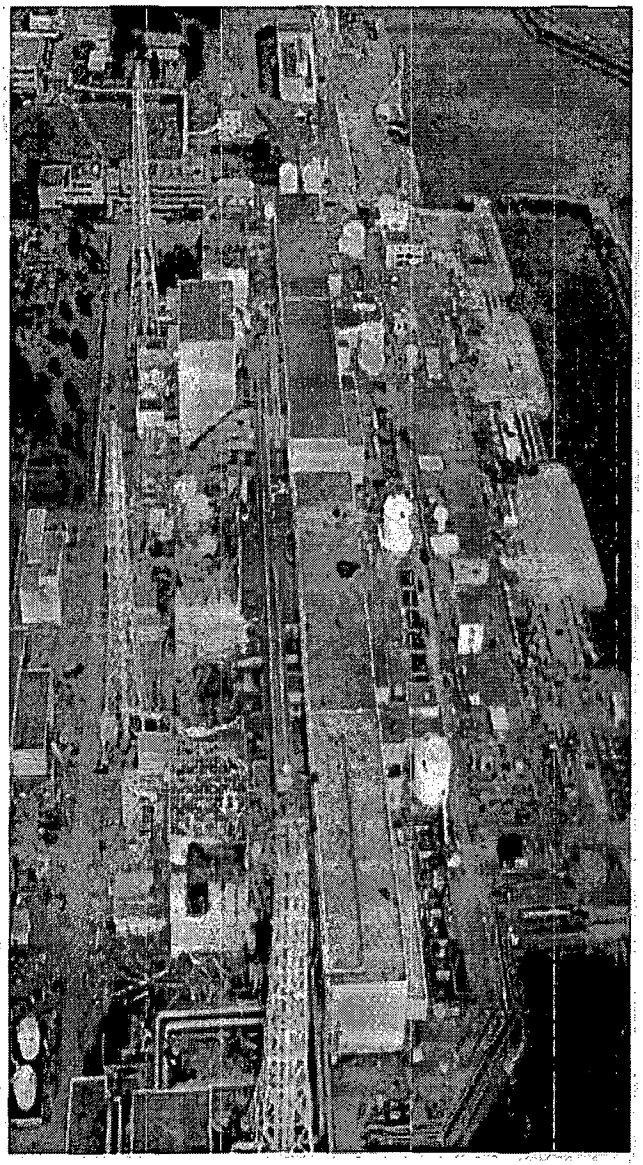
Office of the Deputy Secretary 202-586-5500

Watch Schedule

April 14:	0400-0800
Casey Ruberg	
Brian Robinson	
April 15:	0400-0800
Chris Behan	
Ronald Hagen	

Japan Earthquake Response
April 14, 2011 // 0600 EDT





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Contact: DOE/NNSA Nuclear Incident Team: (b)(6)

DOE/NNSA Objective

- **Objective:** Collect data and provide measurement results and technical advice on radioactive contamination and radiation exposure:
  - In support of the State Department in advising American citizens on protective action and evacuation guidelines
  - In support of DoD in its efforts to safely conduct humanitarian assistance/disaster relief (HA/DR) operations and advise on departure/return of military dependents
  - In support of the Government of Japan (GOJ) in producing guidelines on relocation and use of agricultural lands

Current Status

- TEPCO noted its concern that the spent fuel rods in the storage pool of the No. 4 reactor may be damaged based on interim results of an analysis of samples taken from the pool water on Tuesday.
- MEXT released a computer model prediction indicating that radioactive substances will continue to diffuse.
- TEPCO began pumping 660 tons low-level contaminated radioactive water from Unit 2 turbine trench to condensers. Level of radioactive water in trench and basement of No. 2 reactor's turbine building is decreasing.
- Small amounts of radioactive strontium have been detected in soil and plants outside the 30-kilometer zone around the Fukushima plant.
- TEPCO continues injecting nitrogen gas into Unit 1 reactor containment vessel to prevent possible hydrogen explosion. TEPCO plans to inject nitrogen into Unit 2 on April 20. Nitrogen injection into Unit 3 delayed due to problems accessing equipment.
- Reactors 1-4 and spent fuel pools generally stable and continue to receive fresh water injections (see text SITREP for detailed info) .

DOE/NNSA Emergency Response

- **Command, Control, Coordination:**
  - ***Nuclear Incident Team (NIT):*** Coordinating overall response
  - ***Policy Working Group (PWG):*** Coordinating overall policy
  - ***Senior Energy Official:*** Primary Manager of deployed field teams
  - ***Liaisons:*** DART, USPACOM, USAID, NRC
- **Modeling and Assessment**
  - ***National Atmospheric Release Advisory Center (NARAC):*** Conducting predictive radioactive atmospheric dispersion modeling
  - ***Consequence Management Home Team (CMHT)**:*** Providing scientific assessment of ground measurements and AMS flights
- **Field Monitoring**
  - ***Consequence Management Response Team (CMRT)**:*** Conducting ground monitoring, air sampling and initial results analysis
  - ***Aerial Measuring System (AMS):*** Conducting aerial detection for mapping radiological ground material deposits. Currently 2 platforms: 1 Fixed, 1 Rotary
- **Sampling and Lab Analysis**
  - ***Lawrence Livermore and Los Alamos National Labs (LLNL & LANL):*** Conducting airborne contamination monitor filter analysis
  - ***Savannah River Site (SRS)**:*** Conducting radionuclide analysis of soil samples
- **Medical Consultation**
  - ***Radiation Emergency Assistance Center/Training Site (REAC/TS):*** Providing medical advice about radiological exposure

Deployed* (42)

Yokota AB
(1) SEO
(1) SEO Staff
(36) Field Monitoring

US Embassy Tokyo
(4) DART LNO

**The number deployed does not currently reflect DOE/NNSA personnel assisting in nuclear energy (NE) aspects of the response.*

***Augmented by personnel from the DOE/NNSA Regional Assistance Program (RAP)*

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Significant Events: Past 24 Hrs.

- **Bilateral Coordination**:
  - Conducted an AMS-demonstration and Joint AMS operations discussion Yokota with MEXT and JAEA.
  - Meeting with GOJ representatives regarding product development
    - GOJ organizations represented – NSC, MOFA, NISA, MAFF, MEXT, NUSTEC
    - DOE-GOJ agreed to analyze data provided by other country's collection
    - DOE provided a sample of data in GOJ-compatible format
  - Continued planning and coordination to deliver HPGe detectors:
    - First two detectors will be loaned to:
      - National Institute of Public Health (NIPH) for drinking water analysis
      - Ministry and Agriculture, Forestry, and Fisheries (MAFF) for soil sample analysis
    - Current plan is to deliver HPGe's, conduct training, and assist with setup at the GOJ locations
    - NRL HPGe's arrived 4/11 and will be tested once additional dewers arrive. Testing expected to be completed on/about 15 April

Significant Events: Past 24 Hrs.

- **Modeling and Assessment**
  - Continued to normalize models to field measurements, assess time correlated deposition, conduct trend analysis, and correlate dose rate measurements with actual weather patterns

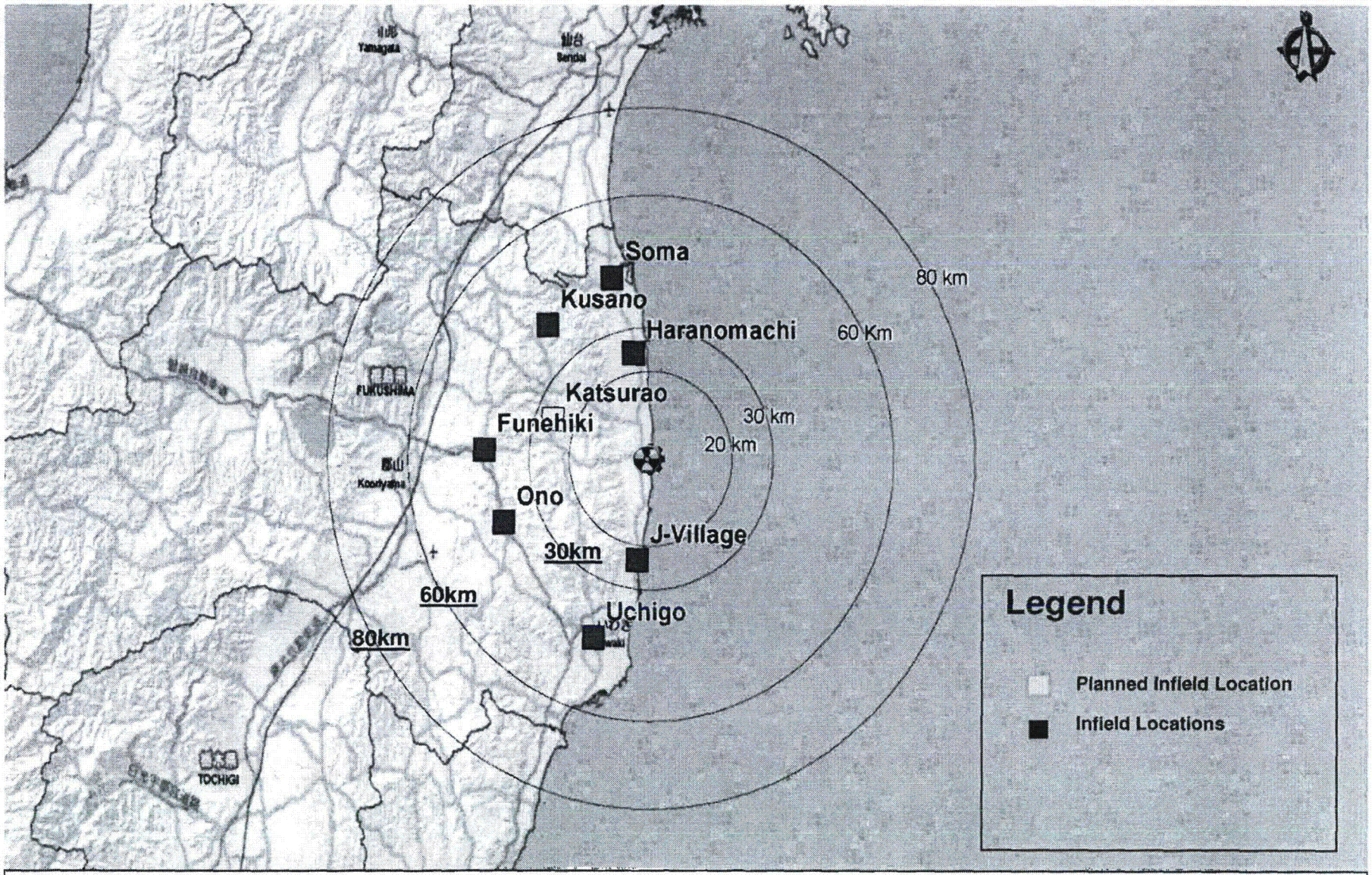
- **Sampling and Lab Analysis**
  - 89 samples received by RAP 3 and were transferred to SRNS for laboratory analysis
  - Conducting analysis of US soil sample shipped to LANL; initial results undergoing decay correction
  - Air samples shipped from LLNL delivered to Radiochemistry lab at LANL

- **Medical Consultation**
  - Nothing substantial to report

- **Nuclear Incident Team**
  - Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, DIA, NCMI, and WH
  - Finalized rotation for deployed personnel

Significant Events: Past 24 Hrs.

- **Field Monitoring**
  - **Aerial Monitoring**
    - AMS UH-1: Surveyed Military installations and the U.S. Embassy. (Campa Asaka, Yokota Air Base,Sagami General Depot, Camp Zama, Atsugi Naval Air Facility, Ikego, Yokosuka Naval Base, Negishi, North Dock, Kisarazu Air Base, and Camp Fuji)
    - AMS C-12: Finished the AMS survey area over the cities of Sukagawa and Koriyama at 1000ft AGL 2000 line spacing to further complete the aerial survey.
  - **Field Monitoring & Assessment**
    - Operations commenced to deploy the Early Warning Array consisting of 8 Infield locations. 7 of the 8 locations were established. A mission to establish the 8th location will be scheduled.
    - Continued monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base
      - One team deployed to Embassy to collect comparative data with USMC and Naval Reactors
    - Continued monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base



Early Warning Array, Infield Locations
April 14, 2011 Operational Period

NNSA
National Nuclear Security Administration

Data Inputs

- **Monitoring**
  - 334 hours total flying time for Aerial Measuring System (AMS) fixed and rotary-wing
  - Over 150,000 total field measurements taken by DOE, DoD, and GOJ fixed stations and deployed teams
- **Sampling**
  - 504 total air samples taken at US facilities throughout Japan for lab analysis in US
  - 52 total ground samples taken throughout Japan for lab analysis in US
  - 89 Japan soil samples received and have been in-processed and are at SRS Environmental Lab for analysis

Organizations Providing Data

- **Consequence Management Response Team**
  - CMRT
  - AMS
  - AFRAT
- **External US**
  - Japan Emergency Command Center, US Embassy, Tokyo
  - USAF, BSC Commander
  - USAF, WC-135 Constant Phoenix
  - Futenma Marine Corps Air Station
  - Nuclear Regulatory Commission
  - Naval Reactors
- **Japan**
  - Ministry of Foreign Affairs (MOFA)
  - Nuclear Safety Technology Center (NUSTEC)
  - Tokyo Electric Power Company (TEPCO)
  - Ministry of Agriculture, Forestry and Fisheries (MAFF)
  - Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
  - Ministry of Health, Welfare and Labor
  - Nuclear and Industrial Safety Agency (NISA)
  - Nuclear Safety Commission

Guide to Interpretation

US EPA Derived Response Levels (DRLs) for Evacuation and Relocation

- **Early Phase DRL**

  If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated by red.

- **First Year DRL**

  If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated by orange.

- **Fifty Year DRL**

  If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area falls within the second year DRL.

- **Second Year DRL**

  If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated by yellow.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years).

Guide to Interpretation

Areas at Risk for Agricultural Contamination

Aerial measurements can indicate areas where agricultural monitoring and sampling should occur, although they cannot directly determine the amount of contamination of agricultural products grown in these areas.

AMS monitoring results in areas beyond 25 miles from the Fukushima Daiichi reactors show areas where dose rates are many times higher than historical background.

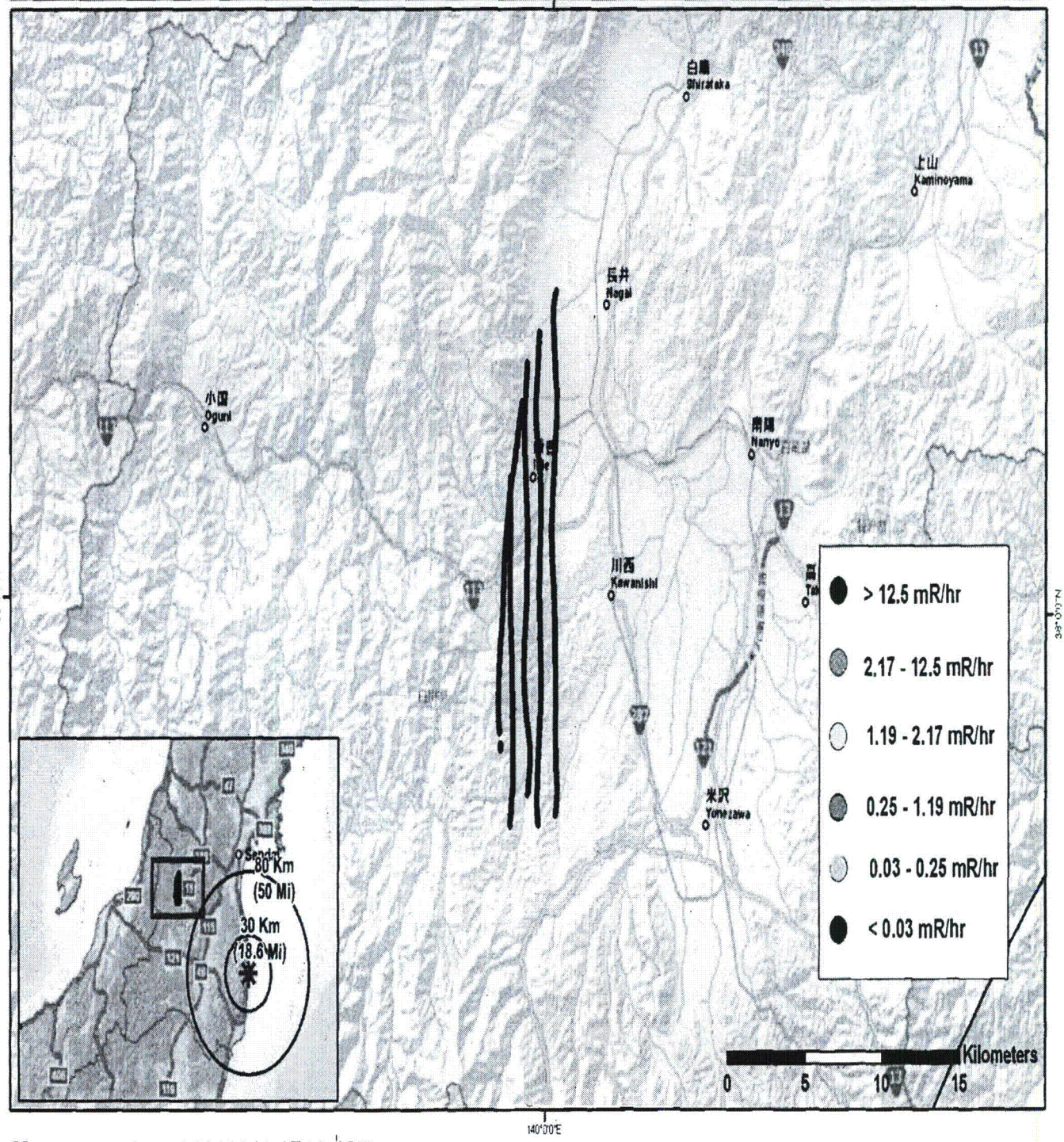
The measured external dose rates in these areas are not high enough to warrant evacuation or relocation of the population, however, lower levels of radioactive contamination in agricultural products provide more of a risk because the radioactive material can be ingested into the body. Agricultural monitoring in these areas may be warranted.

- Areas 10 to 100 times historical background are indicated by green.
- Areas 2 to 10 times historical background are indicated by light blue.
- Areas at or near historical background are indicated by dark blue.

Aerial Monitoring Results

C-12 Flight (April 13, 2011)

FUKUSHIMA DAIICHI
JAPAN



Map created on 04142011 1743 JST

Name: NIT C-12 ResultsInset14Apr2011

UNCLASSIFIED

Nuclear Incident Team DOE NIT

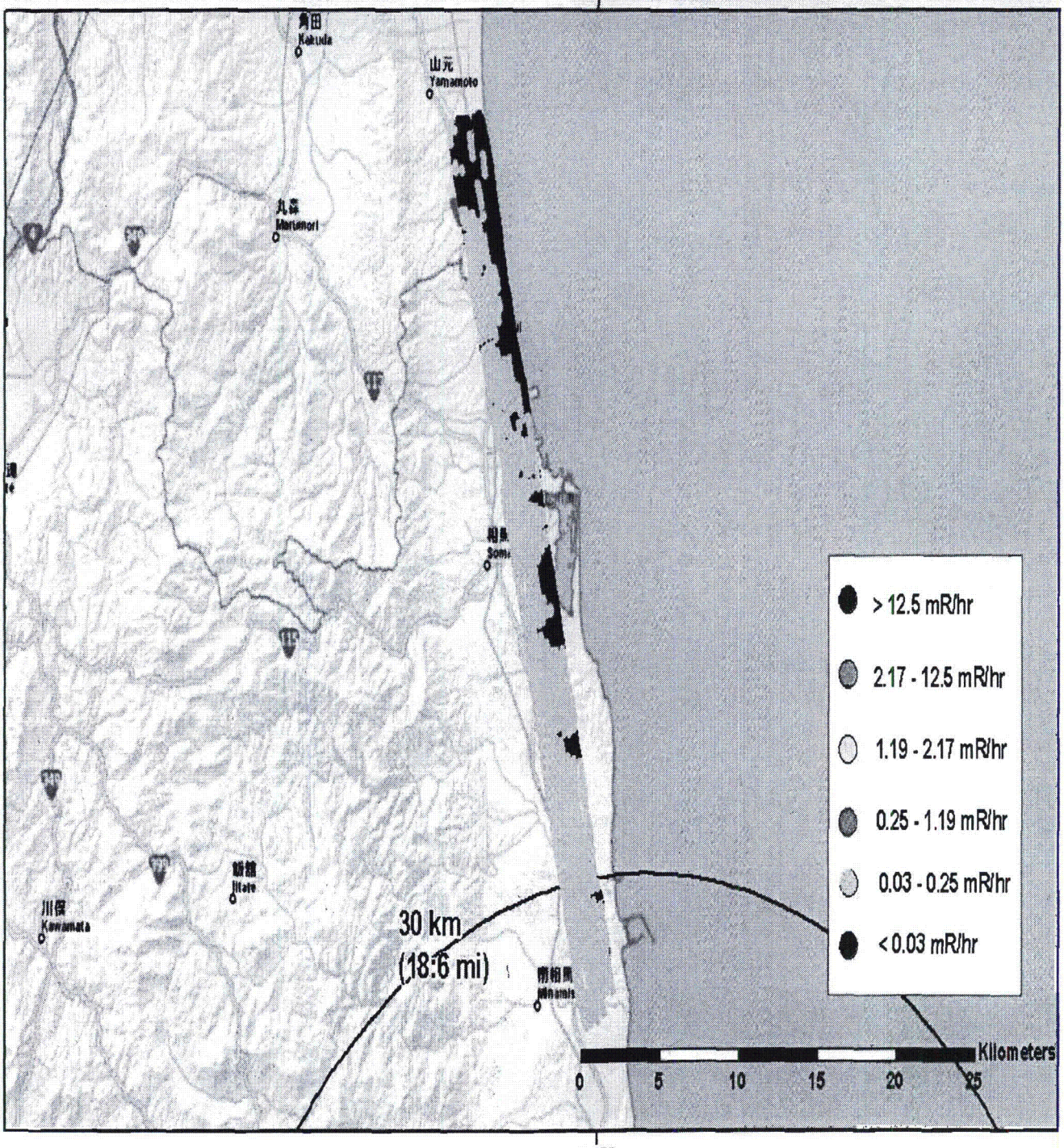
Contact (b)(6)

National Nuclear Security Administration

Aerial Monitoring Results

UH-1 Flight (April 13, 2011)

FUKUSHIMA DAIICHI
JAPAN



Map created on 04132011 2140JST

Name: NIT UH-1 Results 13Apr2011

UNCLASSIFIED

Nuclear Incident Team DOE NIT

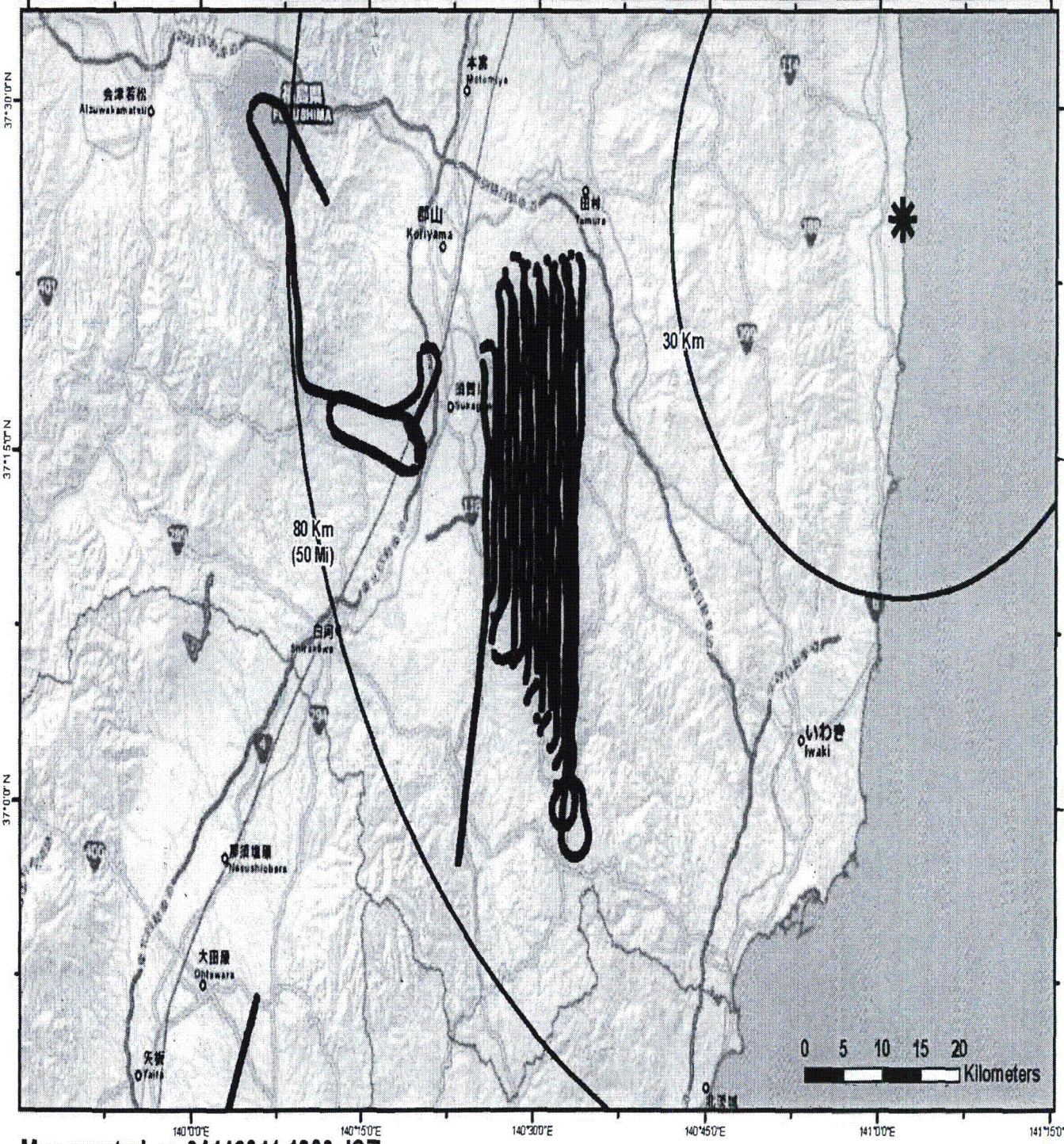
Contact (b)(6)

National Nuclear Security Administration

Aerial Monitoring Path C-12

April 14, 2011

FUKUSHIMA DAIICHI
JAPAN



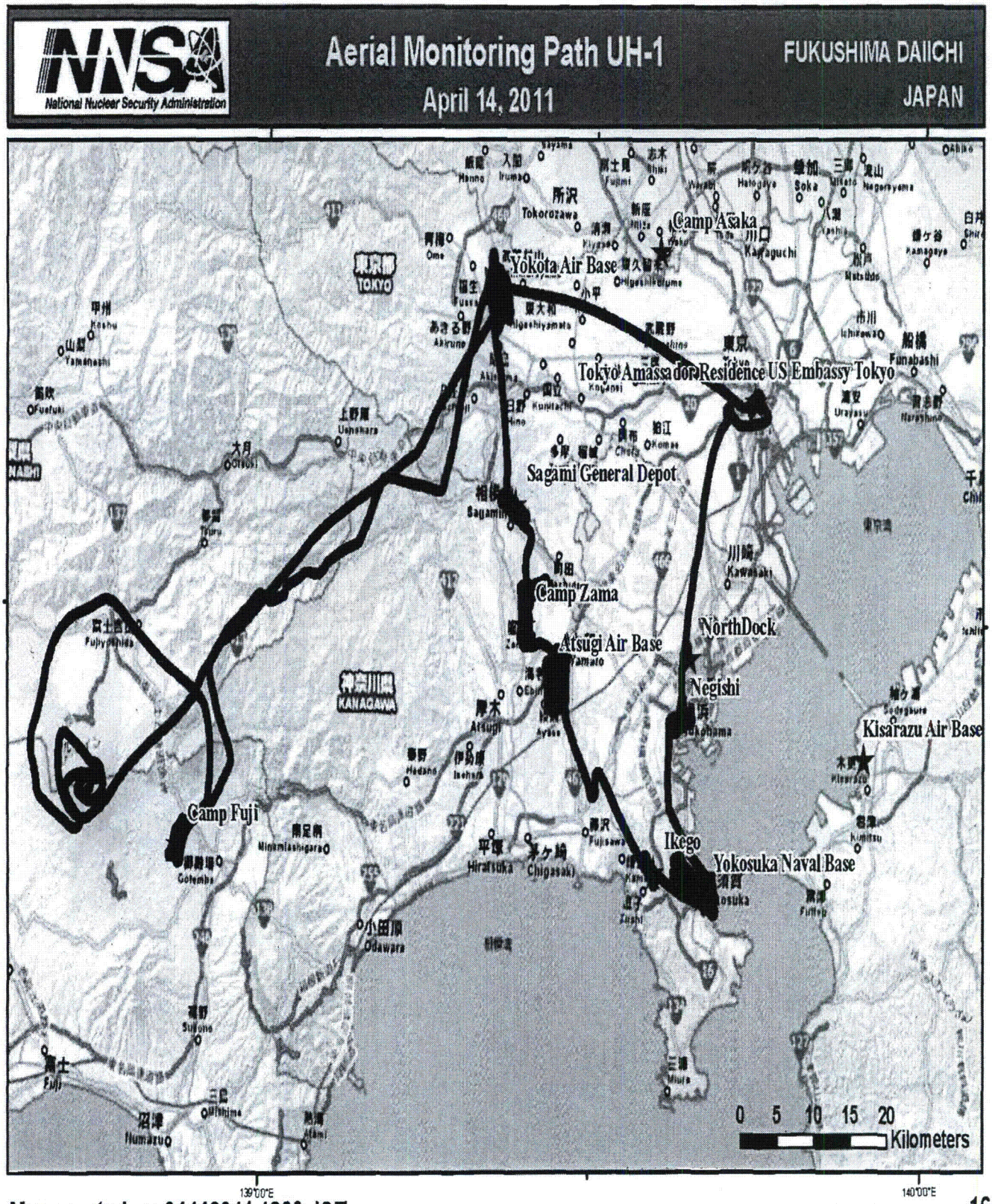
Map created on 04142011 1300 JST

Name: NIT C-12 Path 04142011

UNCLASSIFIED

Nuclear Incident Team DOE NIT

Contact (b)(6)



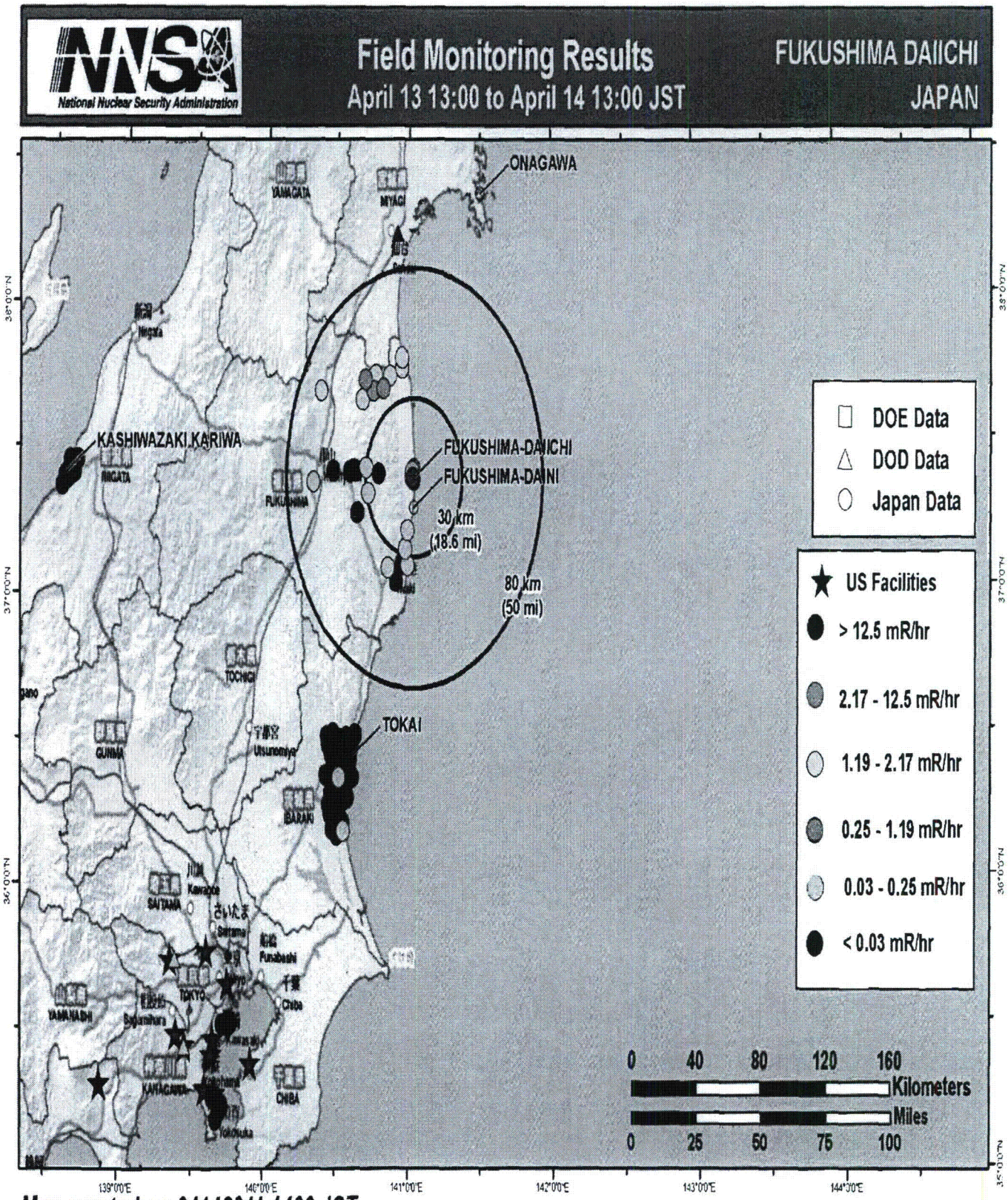
Map created on 04142011 1830 JST

Name: NIT UH-1 Path 04142011

UNCLASSIFIED

Nuclear Incident Team DOE NIT

Contact (b)(6)



Map created on 04142011 1400 JST

Name: NIT 24hrsMonitoringResults 13Apr2011 1300

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Nuclear Incident Team DOE NIT

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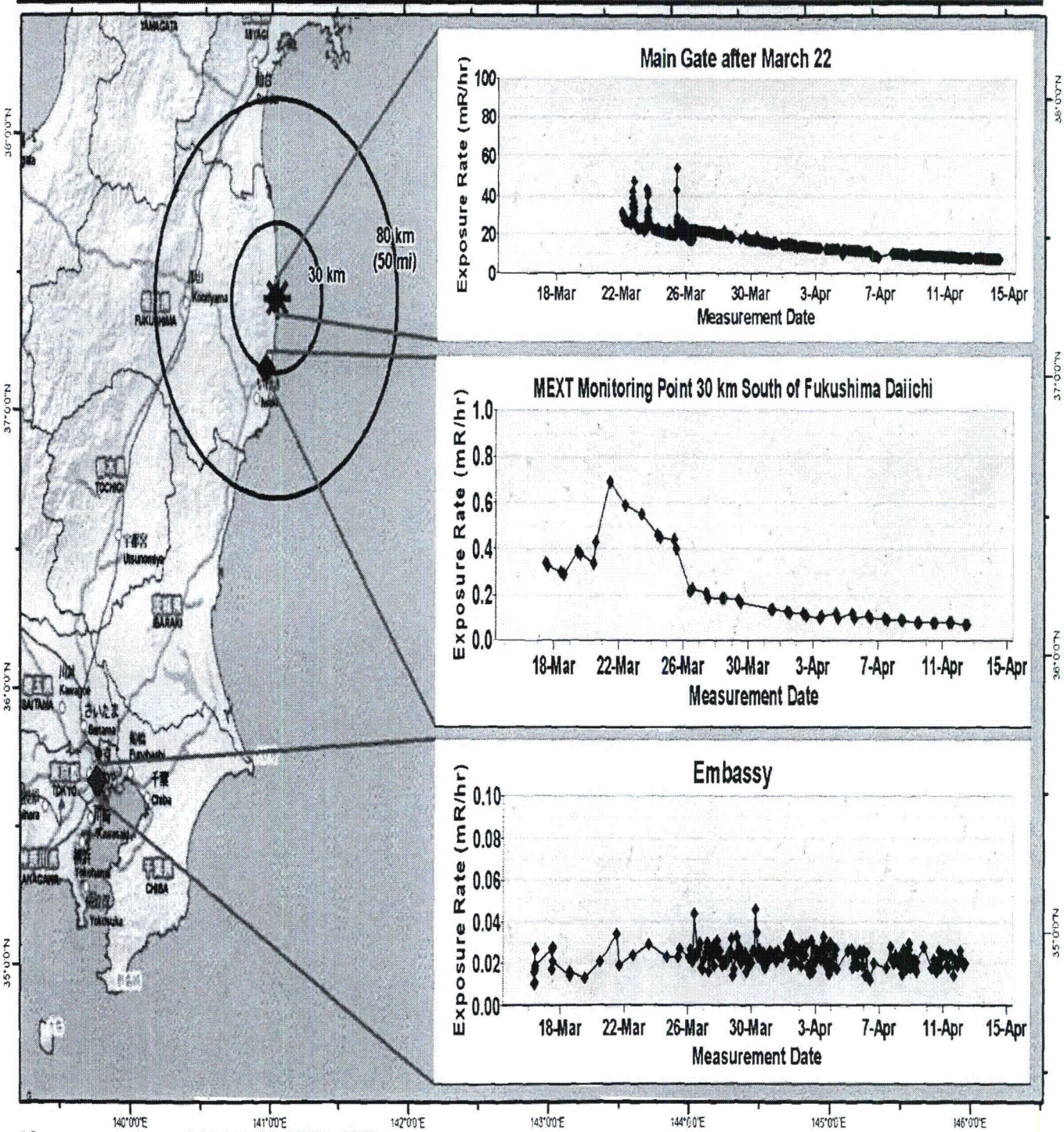
National Nuclear Security Administration

Exposure Rate Trends
From Fukushima South to the U.S. Embassy

FUKUSHIMA DAIICHI
JAPAN



Map created on 04142011 1500 JST

Name: CMHT MonTrend 13Apr2011 Simplified

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Ground Deposition
Guide to Interpretation

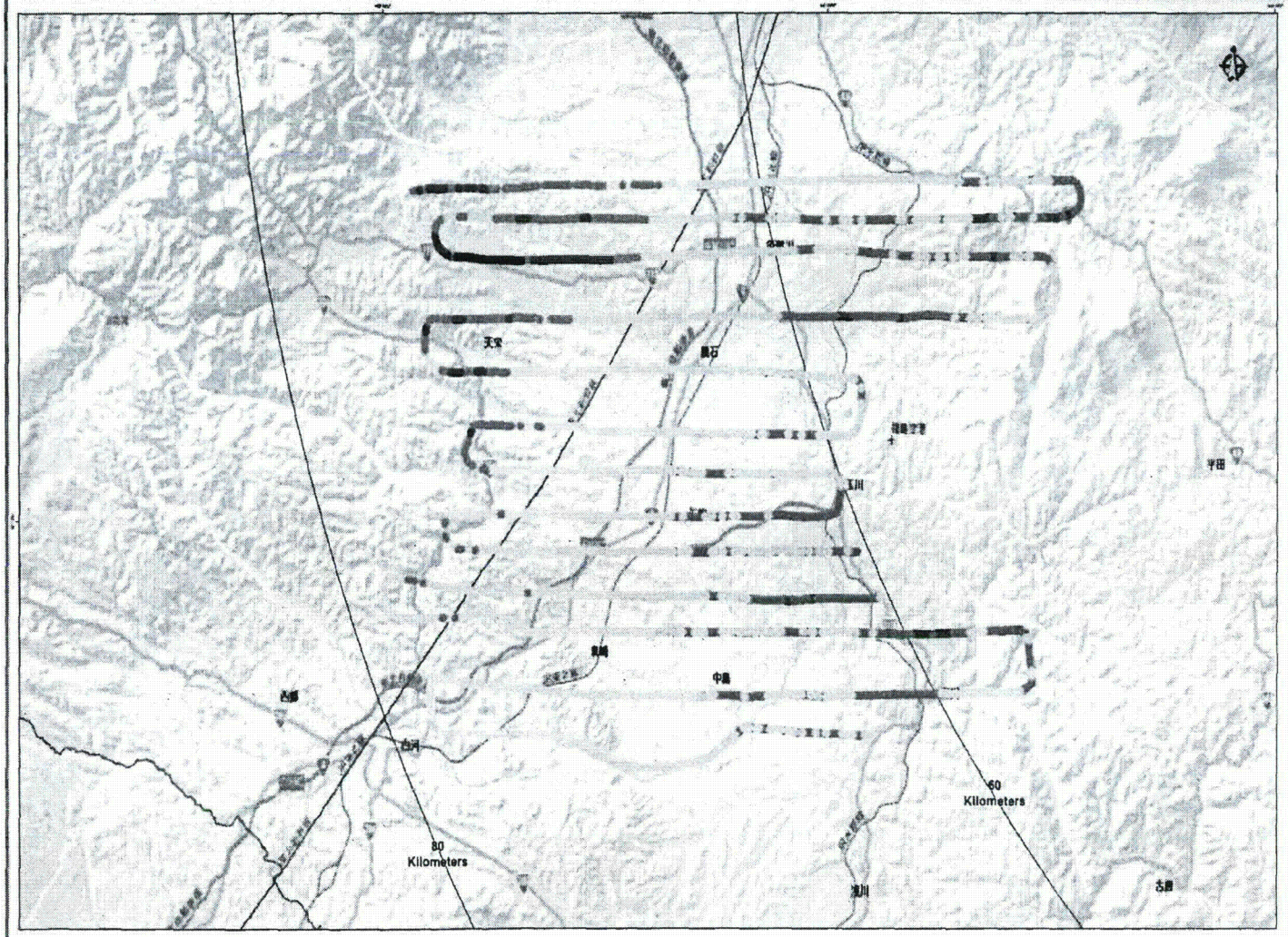
- Isotopic Deposition is extracted from AMS spectral data
  - Cs-134 was chosen because it can be quantified most accurately from the aerial data
  - Quantities of Cs-137 and other isotopes of concern can be inferred from isotopic ratios measured on the ground with high-resolution equipment
- 05 April UH-1 survey chosen for accuracy
  - Lower altitude yields higher quality spectra and better sensitivity
  - Good topographic data available for altitude corrections
  - We've taken many ground measurements in this area
- Maximum concentration (in red) is 3.8×10^5 Bq/m^2 (85% of first year relocation PAG)
- Further analysis is ongoing to reduce uncertainty and display inferred Cs-137 deposition
- Initial estimates are that Cs-137 to 134 ratio is 1
- Results corroborated by Japanese measurements

Cs-134 Deposition

UH-1 Survey Date: April 05, 2011

FUKUSHIMA DAIICHI JAPAN

National Nuclear Security Administration



Deposition - Bq/m²

- 2.7e+005 - 3.8e+005
- 2.0e+005 - 2.6e+005
- 1.2e+005 - 1.9e+005
- 7.5e+004 - 1.1e+005
- 5.7e+004 - 7.4e+004
- 3.8e+004 - 5.6e+004
- 2.1e+004 - 3.7e+004

Technical Considerations and Notes:
- Caution should be used when correlating aerial measurements to ground based measurements and activities at specific locations
- A correction has been added for deposition to heights above ground level based on altitude and the local topography

Not For Public Distribution

Flight Information:
UH-1 Nominal Altitude at 500 ft Above Ground Level, Speed 70 knots

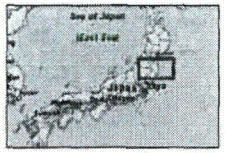
This map was produced by the Geographic Information Systems department of NNSA's Remote Sensing Laboratory (RSL) at Nellis AFB, Las Vegas, Nevada. HSIP Gold 2010, ESRI World Street Map, and CIMIT databases were used for map generation.

RSL map identification number is:
Cs134_Deposition_04052011.mxd

1:75,000

0 1 2 3 4 5 Kilometers

0 1 2 3 4 5 Miles



Map created on 4/13/2011 02:30:00 AM JST

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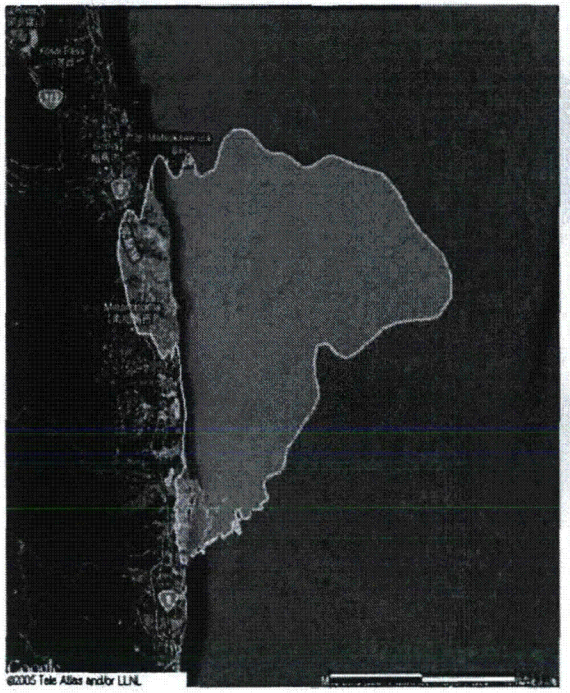
Aerial and Ground Monitoring Data Assessment

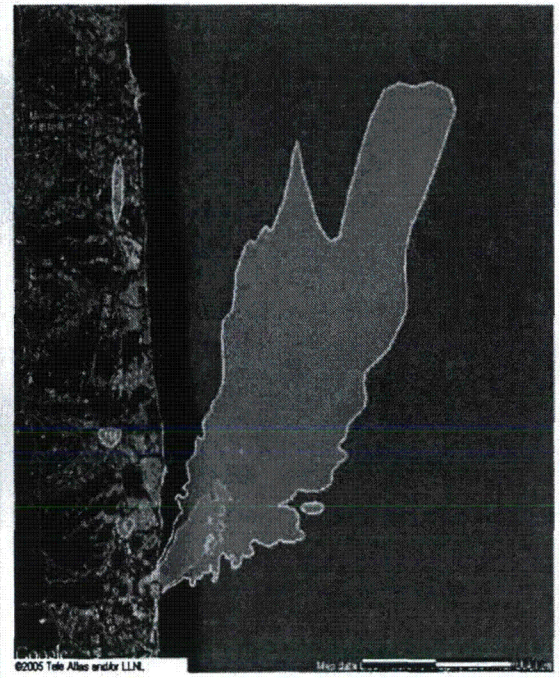
- An assessment of measurements gathered through 12 April continues to show:
  - Radiation levels consistently below actionable levels for evacuation or relocation outside of 25 miles
  - Radiological material has not deposited in significant quantities since 19 March
- An assessment of measurements gathered at US military installations in the Tokyo area through 12 April shows:
  - Radiation levels far below actionable levels for evacuation or relocation
  - All aerial measurements at US facilities were less than 32 μR/hr - a level that poses no known health risk
  - Monitoring of these locations will continue although no increases in deposited radiation are anticipated
- NARAC received local meteorological data from 14 March from GOJ; ECD 14 April to run the NARAC models to provide more accurate deposition

Forecasted Weather
April 14-15, 2011

04/14/11 06:00 JST



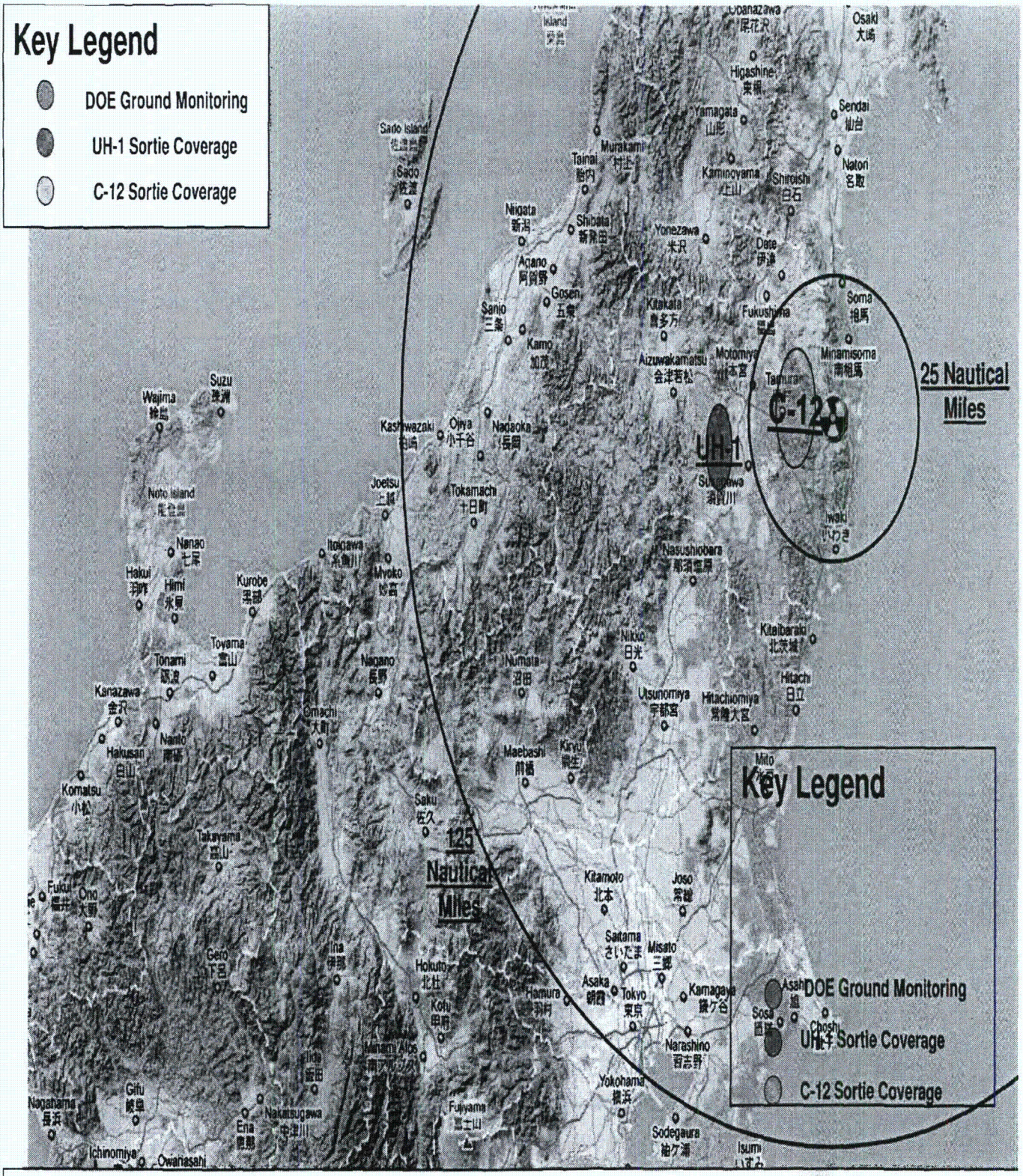
04/14/11 18:00 JST



04/15/11 06:00 JST

Planned Operations: Next 24 Hrs

- Field Monitoring (Aerial)
  - AMS C-12: Will conduct surveys in the 30 to 60 km circle from approximately 10 to 40 kilometers west of Fukushima- Daiichi between the cities of Koriyama on the south and Watary on the North at 1000ft AGL 2000 line spacing to further complete the aerial survey.
    - Two personnel from MOD Air Defense Command will ride along
  - UH-1 aircraft, weather and winds permitting, survey the Joint U.S. and Japan Flight Area at 500 ft AGL at 1000 ft line spacing.
    - One personnel from MOD Air Defense Command will ride along
- Field Monitoring (Ground)
  - A team will establish the final infield unit at Katsurao and will install additional batteries on the J-Village Infield location which should provide power for up to two weeks.
  - Two Field teams will deploy to collect survey data in AMS box west of Koriyama and Sukahama.
  - Continue monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokusuka Naval Base.
    - One team deployed to Embassy to collect comparative data with USMC survey position
- Sampling and Analysis
  - Continued analysis of air samples at GEL Laboratory
  - Receive and initiate analysis of soil samples at Savannah River Site



Planned Aerial/Field Monitoring Operations

April 14, 2011 Operational Period

National Nuclear Security Administr